ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

MANUFACTURERS' DIRECTORY

APRIL 1944
25c a Copy

TO KEEP THE WAR PLANTS HUMMING,
THE HORNETS' NESTS ARE HUMMING...
THROUGH THE NIGHT
THE POWER OF GIANTS...
THE START OF A NEW DAY
THERE IS NO NIGHT...
IN EVERY SHIP, PLANE AND TANK,
Southern California Edison Company, Ltd.
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Electricity IS WORKING AROUND THE CLOCK FOR VICTORY

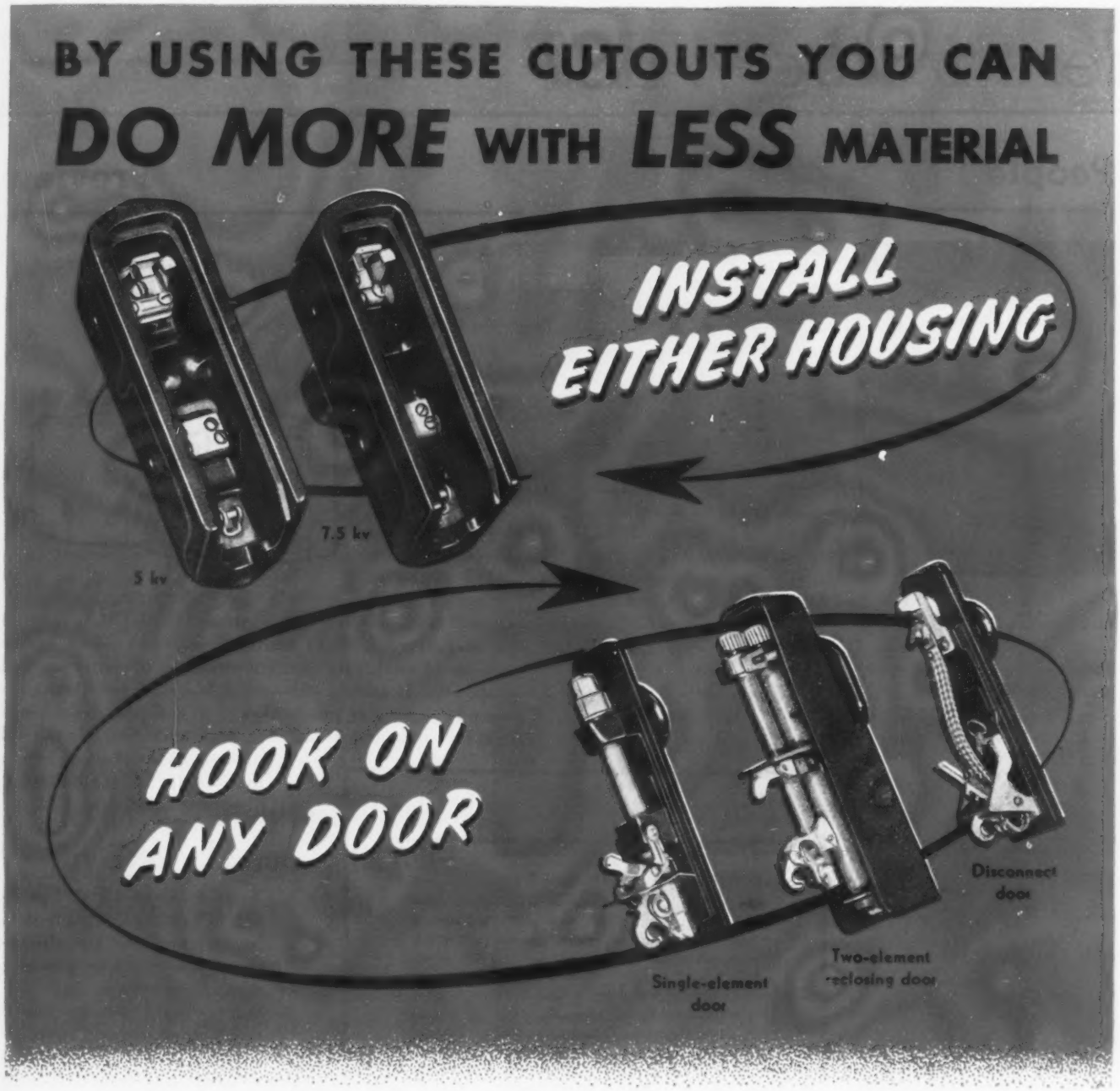
In the series of advertisements shown here, currently appearing in the Wall Street Journal and other publications, the Edison Company tells the story of electricity's importance in the war effort . . . points out that every power need of war industries in Edison-served territory has been met with ENOUGH electricity, ON TIME. ● The Edison Company's record is typical of the excellent job the entire industry is doing to win victory.

Conservation of electricity will help win the war!

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), April, 1944. Vol. 92, No. 4. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year: all other countries $3 gold. Single copy 25c. Copyright, 1944.

BY USING THESE CUTOUTS YOU CAN DO MORE WITH LESS MATERIAL



WHEN you use G-E fuse cutouts, smaller stocks adequately take care of your requirements. Why? Because each G-E cutout can do any one of three different jobs. You can convert a G-E cutout from a single-element unit to a reclosing unit, or to a disconnect, simply by changing the door.

The single-element door has a selecting device to permit either indication of a blown fuse or "drop-open" action. The reclosing door contains the entire mechanism, complete with one-second time delay before reclosing. The disconnect door has an indicating feature for easy spotting, and a can't-be-lost blade which is isolated to protect the lineman.

Just five major parts, in the 50-ampere rating, will fill 80 per cent of all distribution-cutout requirements. And there's a similar two-housing, three-door combination in the 100-ampere rating to take care of the other 20 per cent.

Ask for Bulletin GEA-3448. *General Electric, Schenectady, N. Y.*

FUSE CUTOUTS

GENERAL ELECTRIC

406-14-5224

Here in the WEST

People

Capt. E. A. Whitehead

whose description of captured enemy electric equipment, p. 56, makes interesting reading, is now in the office of Chief Signal Officer, Washington. But to Westerners he is "Whitey", Pacific District lighting engineer, General Electric Co., San Francisco, native of Woodland, Calif., U.C. graduate 1928. In officers reserve since college, before being called he was radio, television and electronics specialist for G-E. During the Golden Gate Fair he worked with Dickenson on the spectacular lighting design. Originally in Artillery, he was transferred to Signal Corps, sent to Ft. Monmouth for additional training over his previous G-E and Stanford post graduate radio and electronics work.

Rollo J. Cobban

now stationed with Hawaiian Electric Co. as Westinghouse representative (p. 59), though born in Minnesota, has spent most of his 35 years with Westinghouse in the West. He was in Butte from 1910 to 1923, in Portland for seven years, San Francisco eleven years. At Pearl Harbor he distinguished himself by his prompt response and hard work to assist the Navy in the hours of disaster.

Pages

Let's Not Drag In On the Late Train 53
By Kimball Jack—Keep it not secret, your postwar planning It may seem premature but, as any farmer knows, spring cultivating and planting is necessary for the fall crop.

Enemy's Equipment Loss Is Our Gain 56
By Captain E. A. Whitehead, U. S. Signal Corps—Captured enemy equipment is analyzed for weakness as well as merit.

Light Questions Affect the Future 64
By seeking the answers, each one may better plot his own plans for lighting development in a changed and new postwar environment.

How About Postwar Margins? 72
A utility man asks the questions that are on everyone's mind; a manufacturer answers.

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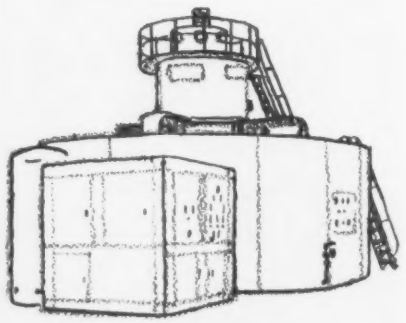
Preview

Pit 5

is the newest plant to be added to the vast generating network of Pacific Gas and Electric Co. With it the total capacity in hydro and steam far exceeds Bonneville and Grand Coulee. The engineering details of this new hydro plant in northern California, will be described and illustrated in the May issue of this magazine. Built in wartime, much was done in the interests of simplicity and conservation of materials and manpower. It adds a substantial block of generating capacity to serve war production now and peacetime needs after the war and is further insurance that there will always be plenty of power in the West, no matter what else runs short.



Defends No. 14

Another slant of the problem of greater adequacy is to be thrown into the discussion by an engineer who asks why frequencies and voltages should not be raised rather than copper sizes increased. His comments, appearing next month, will be stimulating and thought provoking. If copper and iron continue to be critical materials his suggestions may even become prophetic.

Mountain Meetings

Though difficult to hold these days, the need for meetings to exchange methods and experiences was never more appreciated. In the Rocky Mountain region this month the Rocky Mountain Electrical League will hold important meetings, so will the Rocky Mountain, the Utah and Montana chapters of the electrical inspectors. Full report of them will be made next issue.

YOU SAVE

...Man-Hours, Money, Materials!

Here's Power Where You Need It . . . an Allis-Chalmers Dry-Type Transformer Installed Right at Load Center!

THAT 25 KVA Allis-Chalmers Dry-Type Transformer is mounted on a post—*right by* the grinder it serves!

You can put these modern units *anywhere.* There's no danger of oil leaks . . . no need for fireproof vaults! Maintenance is no problem either . . . without insulating liquid to test, filter or change!

Load center location gives you finer voltage regulation, lower line losses, improved motor performance—cuts need for long runs of secondary copper!

Allis-Chalmers Dry-Type Transformers are available for quick delivery . . . *now!* Get the full story from our nearby district office. Or write, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 1693

CHECK THESE TRANSFORMER FEATURES:

Smaller, Adaptable Size — permitting quick, easy changeover.

Easy-To-Get-At connections and knockouts; fast installation.

Windings Separated by solid insulation — meet safety requirements for inside buildings.

Coils Heavily Impregnated — rendering windings resistant to moisture.

Wide Range of Sizes — 1½ to 500 kva, single and 3-phase, with incoming voltages up to 15,000 v.

ALLIS-CHALMERS DRY TYPE TRANSFORMERS

A NEW Westinghouse

The increased use of instant starting ballasts for 40 watt lamps has developed the need for a lamp which will operate satisfactorily on such ballasts. Westinghouse engineers have now perfected a lamp for this purpose.

This new 40 watt white Westinghouse Mazda Fluorescent lamp will have the same rated life when operated on the instant starting ballast that the standard 40 watt Westinghouse Mazda Fluorescent lamp now has when used with conventional ballasts and starters.

It should be ordered only for use on the instant starting ballast and should not be ordered for use in installations having preheat starting. It will be specially marked and will have the same list price as the standard lamp. Limited quantities of these lamps will be available for shipment on and after May 1, 1944.

New developments such as this typify the skill and resourcefulness of Westinghouse engineers. Based on a persistent policy of product improvement, they are the reason why the name "Westinghouse" has come to mean leadership in lighting.

They are the reason, too, why it pays to recommend Westinghouse Mazda Lamps for every lighting application and installation. Westinghouse Elec. & Mfg. Co., Bloomfield, N. J. *Plants in 25 cities . . . offices everywhere.*

Westinghouse

MAZDA LAMPS FOR SEE-ABILITY

FLUORESCENT LAMP

LET'S ALL KEEP BACKING THE ATTACK... BUY MORE WAR BONDS

Simplex-Tirex Flexible Cords and Cables

Now Have *"Synthetic Rubber"* Insulation and Sheath

Many of the industries now classed as "essential" have used millions of feet of TIREX – rubber sheathed – cords and cables. During the war their demands for Tirex have increased to such an extent that little has been left for normal commercial uses. Mines, shipyards, railroads, and other vital war activities have needed every foot that could be made.

At the same time, the sources of supply of natural rubber have been cut off and available stocks have been reduced until rubber can be used only for purposes where no substitute can be found. It can no longer be used in sheath compounds for cable – and only in insulation for a very few types of cable where service requirements preclude the use of synthetic materials. Synthetic insulations and sheaths have replaced rubber compounds and the new materials have, in many instances, exceeded expectations both mechanically and electrically.

In flexibility, toughness, abrasion resistance and safety, the Tirex of today – we call it "WAR-TIREX" – approximates prewar TIREX standards. In essential industries doing important war work Simplex WAR-TIREX cords and cables are doing an outstanding job. Performance records indicate that synthetic insulations and sheaths may have an important place in postwar work.

If you need flexible cords or cables for portable electrical tools or mobile equipment, we shall be pleased to tell you how Simplex WAR-TIREX can serve you.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

ARMY E NAVY

M

Simplex

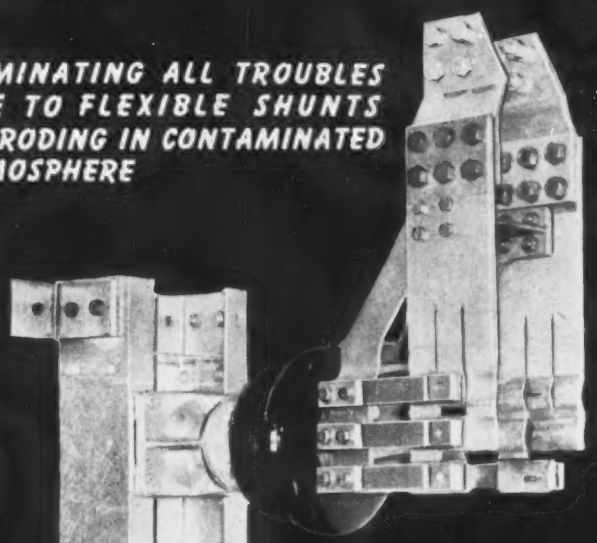
WIRES and CABLES

PACIFIC COAST OFFICES

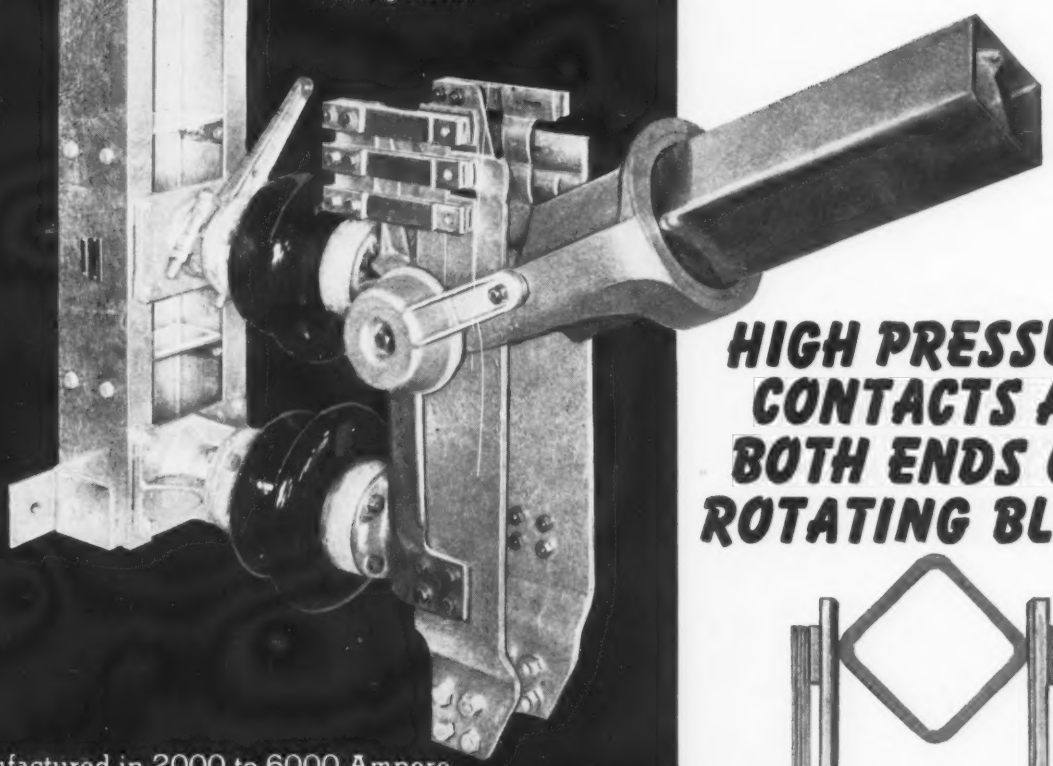
390 Fourth St., 910 East Third St., 503 Polson Bldg.,

NO BRAIDS* ON THESE "MK-39" SWITCHES

* ELIMINATING ALL TROUBLES DUE TO FLEXIBLE SHUNTS CORRODING IN CONTAMINATED ATMOSPHERE



Single-Pole Unit of 23 Kv., 4000 Amp. 3-Pole Disconnecting Switch



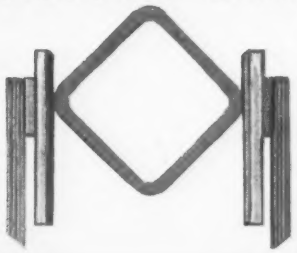
Manufactured in 2000 to 6000 Ampere Ratings -- 7.5 to 34.5 Kv. Inclusive

ALSO CONSIDER THESE FEATURES

1 High-Pressure Silver-to-Copper Contacts
2 Straight Line Current Path
3 Completely Counterbalanced Blade—Insuring Ease of Group Operation
4 Rugged Construction—Ample Inherent Electrical and Mechanical Safety Factors
5 Upright, Vertical or Inverted Mounting

WRITE FOR PUBLICATION 4209

HIGH PRESSURE CONTACTS AT BOTH ENDS OF ROTATING BLADE



DELTA-STAR ELECTRIC COMPANY

MAIN OFFICE AND FACTORY—2400 Block, Fulton St., Chicago 12, Ill.
NEW YORK OFFICE—140 Cedar St., New York 6, N. Y.

DISTRICT REPRESENTATIVES IN THE FOLLOWING CITIES

DENVER 2, COLORADO
Mountain States Machy. Co., H. L. Vaughn, 1526 Blake St.

LOS ANGELES 13, CALIF.
W. W. Kirk Co., W. W. Kirk, 415 Wall St.

SALT LAKE CITY 1, UTAH
W. W. Kirk Co., C. L. Evans, 613-14 Dooly Block.

SAN FRANCISCO 3, CALIF.
W. W. Kirk Co., E. B. Cook, 1063 Howard St.

SEATTLE 2, WASHINGTON
W. R. Hendry Co., G. R. Hendry, 2021 Minor Avenue, No.

Thousands Plan New Homes

FOR OUTSTANDING ACHIEVEMENT IN WAR PRODUCTION

ELECTRIC **Hotpoint** KITCHENS

. . . with All-Electric Kitchens

HOTPOINT'S SUCCESSFUL "BOND WAGON" DRIVE Gives Proof

WIDESPREAD interest both in home building and in electric kitchens is shown by returns from Hotpoint's national advertising campaign, which for the past two years has featured: "Buy War Bonds Today—Electric Kitchens Tomorrow." This is your Bond Wagon too. Climb on!

Thousands Wrote for Home Planning Files. The "Home Planning File," offered for 25¢ in Hotpoint national magazine advertisements brought thousands of letters. Nearly all the writers plan to build new homes after the war—and they want Hotpoint Electric Kitchens.

Think What This Means to You. These thousands who plan to build new homes with electric kitchens are your future customers. They give you a big stake in the postwar business picture. As a result of the good will built by our War Bond advertising program, Hotpoint's franchise with the public is stronger—more secure than ever.

More Electric Kitchen Advertising for 1944. Naturally, with such results, Hotpoint's advertising for 1944 will further develop this successful theme. Keyed to the tempo of today, Hotpoint's new advertising program will provide more specific information for those thousands who are now planning new homes with Electric Kitchens. And remember that this campaign is doing a job for you. Take advantage of it in every way you can, preparing for the happy day when Hotpoint equipment will again be available for civilian use.

Edison General Electric Appliance Co., Inc.
5612 West Taylor Street, Chicago 44, Illinois

MORE HELP FOR YOU

As a result of the tremendous interest in home planning and electric kitchens, Hotpoint now has in preparation a book to help home builders and modernizers plan the truly modern kitchen. It is entitled "Your Next Kitchen." Watch for announcement of publication.

BETTER CARE
Conserve Electric Servants
LESS REPAIR

TOMORROW'S LINEMEN WILL BE KLEINMEN, TOO

STRINGING wire is tough work. Men in the armed forces who have had to keep communication lines open under battle conditions know how good tools and equipment can aid them in their job. Today, Klein is producing this essential equipment for the Army and Navy and for war industries at home.

When the war is won and these Kleinmen return to their peacetime tasks, they are assured of the same high quality in their belts and straps—climbers and grips—pliers and wrenches that they knew before the war—the same high quality that is serving them today. They will recognize the name Klein as standing for the finest in tools and equipment.

This book on the care and safe use of tools will be sent without charge on request.

Since 1857

ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.

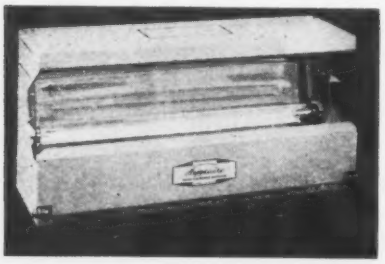
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

KLEIN TOOLS EST. 1857

PRODUCTS *that are news*

Ultraviolet for Offices (400)

Hygeaire, an ultraviolet germicidal radiation system for use in offices and industrial plants, is being manufactured by the American Sterilizer Co. and distributed by Graybar and General Electric Supply Co. The system is a combination of the germicidal



tube and a patented reflector in a fixture designed to project a zone of protection across an area above eye level. Air-borne bacteria and viruses are carried into the zone of ultraviolet rays by convected air currents, giving to the protected space the germicidal effect of 100 air changes per hour, it is stated.

Indicator (401)

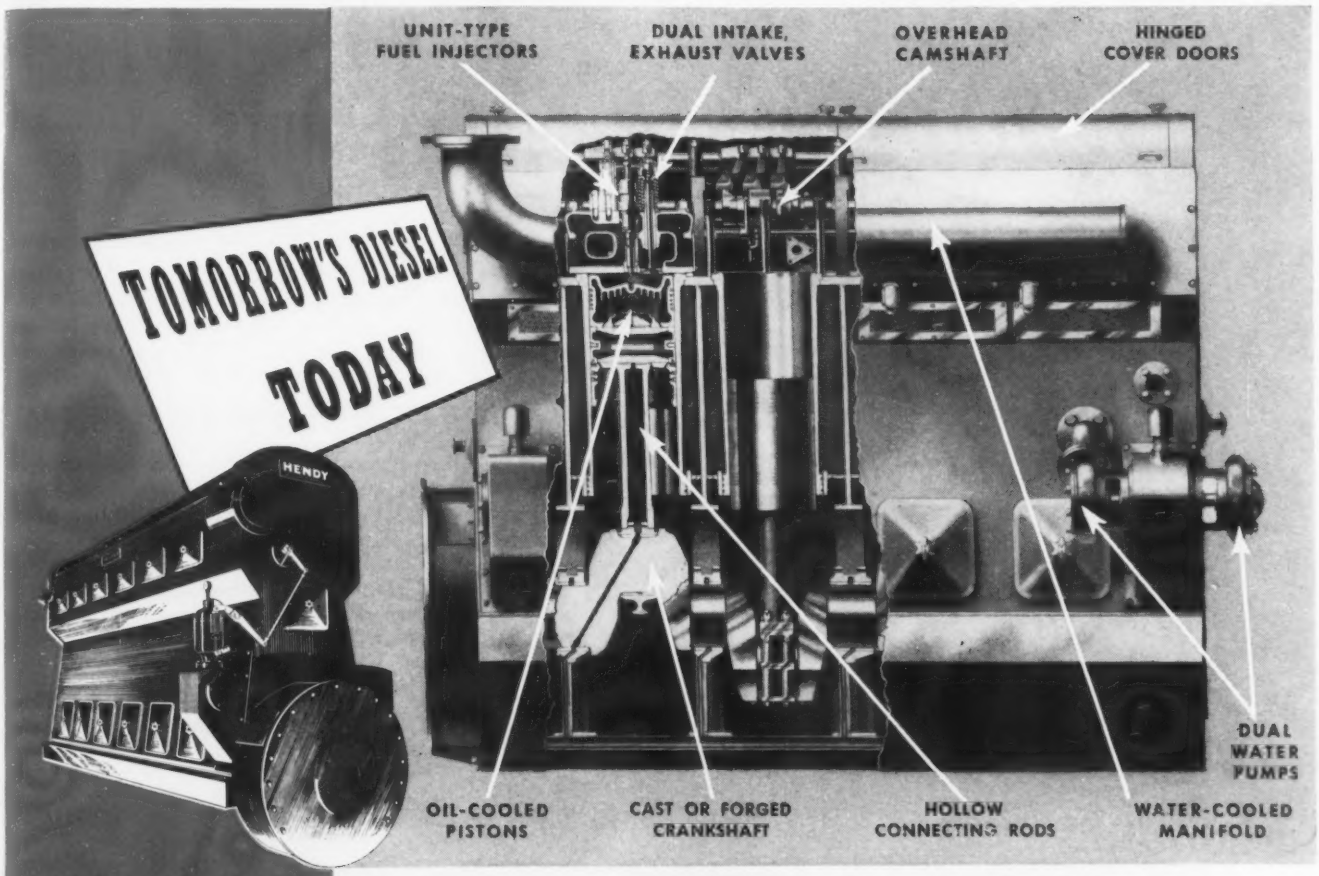
James G. Biddle Co. has announced the Jaeger speed indicator, a "vest-pocket" device which adds up the number of revolutions over a period of six seconds and shows the revolutions per minute without calculations. According to the announcement, the instrument is not read while operating but is allowed to run until it stops automatically, then is read at leisure. It is said to differ from the conventional centrifugal type tachometer in that it does not show instantaneous speed or speed variations. It is not much larger, or heavier, than a good-sized watch, it is stated.

New Mazda Lamp (402)

Development was announced recently of a 40-watt white Mazda F lamp which has the same rated life when operated on instant starting ballasts as the present 40-watt lamp now has with conventional switch starting. A limited quantity of these lamps will be available after May 1. Warning is issued by the manufacturers that this lamp should be ordered only when it is to be used without preheating starting, that is, on instant starting ballasts. Price is the same as the standard 40-watt F lamp.

Portable Furnace (403)

A portable, self-powered, automatic forced warm air furnace weighing 45 lb. has been developed by Norge division of Borg-Warner Corp. This sealed unit is said to provide a flow of pure heated air sufficient to keep an average single family home warm in the coldest weather. Wartime application of this furnace is for undisclosed ground and flight applications by the Army Air Forces.



GENERAL SPECIFICATIONS
SERIES "50"
Bore—12"; Stroke—15"
350 to 600 hp.
RATED POWER
at 450 r.p.m.
75 hp. per cylinder
Available with reduction gears and power take-off to meet special conditions.

Write for complete data on the Hendy Series 50 Diesel Engine

Only HENDY DIESELS
Combine all these features...

For the first time, 22 important design and construction features are combined in a single engine—the Hendy Diesel. Each makes a substantial contribution to low-cost operation or longer engine life. More than a half century of power-plant experience — plus expanded facilities — gives Hendy unusual ability for volume production of these new Diesels.

In addition to the features illustrated, Hendy Diesels have positive, full-automatic lubrication...controlled cooling system ...mechanical or hydraulic governing...centrifugally cast, babbitt-lined, steel-backed bearings...and centralized controls. Before you invest in any Diesel—be sure to look at Hendy's. For simplicity—long life—for modern design—look to Hendy.

JOSHUA HENDY Division
JOSHUA HENDY IRON WORKS

SUNNYVALE, CALIFORNIA

ESTABLISHED 1858

BRANCH OFFICES: Boston • Buffalo • Chicago • Cincinnati • Cleveland • Detroit • New York • Philadelphia • Pittsburgh • San Francisco • St. Louis • Washington • Los Angeles

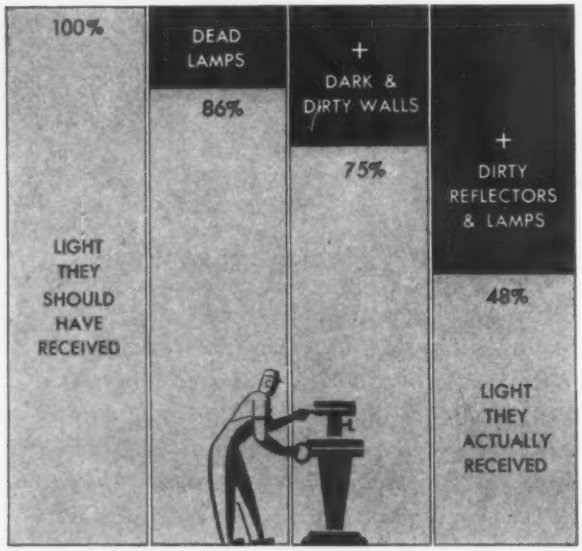
Fluorescent operating hints

No. 3 of a series published by SYLVANIA for all users of fluorescent lighting

HOW TO GET THE LIGHT YOU PAY FOR

Observing a few simple operating rules can prevent waste of as much as 50 per cent of the fluorescent light you buy.

For example, here is the waste caused by improper maintenance in one typical plant:



Dead lamps left in fixtures rob this plant of 14% of the light that is being paid for — dark and dirty walls, of 11% more—dirty reflectors and lamps, of 27% more. Why get only half of the light that simple maintenance will bring you?

SCHEDULING MAINTENANCE SAVES DOLLARS IN LIGHT

Schedule regular checking and cleaning. All you need is a lightmeter.

Whenever the meter shows that you are receiving 25% less light than you should—it's time to check for dead lamps, and to get out the soap and water.

Attend to dead lamps first. Unless they are cut out of the circuit, they tend to overheat ballasts, wear out your starters, and waste electricity. But before you discard lamps, be sure the fault is not in the starters, ballasts, or circuit.

"TWO-MAN TEAM" MAINTENANCE METHOD

All you need to insure clean lamps and reflectors is plenty of soap and water—plus a *regular* maintenance schedule. The following two-man method has been proved very successful.

1. Two-man team begins work with one clean reflector previously removed from a fixture near the end of the cleaning route.

2. At first fixture on the route, man on ladder removes lamps and reflector, hands them down to man on floor in exchange for previously cleaned reflector. Ladder man then cleans housing, side panels, etc.

3. Ladder man secures clean reflector in place. (No hand tools are required with Captive Latches on Sylvania Industrial Fixtures). Man on floor wipes off the lamps and passes them back to ladder man.

4. Ladder man, with supply of Sylvania Starters, reinstalls cleaned lamps and sees that fixture is working properly.

5. Ladder man descends and puts ladder in place at next fixture. Meanwhile, man on floor washes and dries the first fixture and has it ready to replace soiled reflector in the next fixture.

Follow this procedure through entire installation.

HOW OFTEN?

Frequency of cleaning depends upon the location of installation and the type of work it lights. Air-filtered and air-conditioned rooms may require fixture cleaning only once in six months. But cleaning may be necessary every few weeks in a factory where the atmosphere is heavy with dust and oil. Be guided by your lightmeter in scheduling cleaning.

For Additional Maintenance Information

Send for this Free Booklet—

100,000 already distributed

SYLVANIA ELECTRIC PRODUCTS INC.

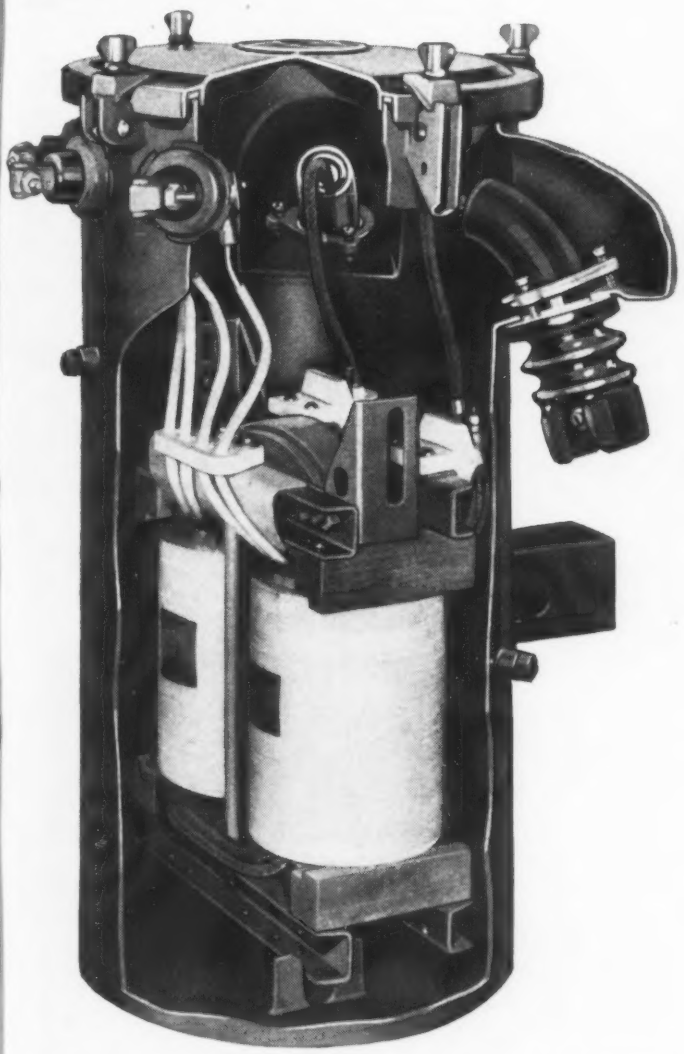
"Fluorescent at its Finest"

555 South Flower Street, Los Angeles, California
111 Sutter Street, San Francisco, California
White-Henry-Stuart Bldg., Seattle, Washington

FLUORESCENT LAMPS, FIXTURES AND ACCESSORIES, INCANDESCENT LAMPS, RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES

Only L-M can offer the "ROUND-WOUND"

Only Distribution Transformer That Combines Two Round Coils on a Wound Round Strip Steel Core... Distinctly NEW in Improved Regulation at All Power Factors . . . Better Ratio of Losses . . . Uniformly Longer Service Life . . . Uniformly Lower Exciting Current . . . Complete Accord with E.E.I.-N.E.M.A. Standards.



ROUND COILS WOUND CORE

The L-M Distribution Transformer was the first to combine two round coils with a wound strip steel core. Both coils and core are machine wound. This gives you performance that increases your revenue, lowers your operating cost and builds up satisfied customer relations.

Round-Wound construction of both coil and core . . . the latter never disturbed after annealing . . . gives a precisely balanced magnetic unit that provides improved regulation at all power factors, better ratio of losses, uniformly longer service life, uniformly lower exciting current, and delivers better voltage to the customer.

Let the L-M Field Engineer show you how L-M Round-Wound construction gives higher short time overload capacity, gives greater immunity to lightning damage and has lower copper losses and lower total losses. Detailed engineering data is available. For full information write to Line Material Company, Milwaukee, Wis.

L-M DISTRIBUTION EQUIPMENT INCLUDES:

Transformers · Fuse Cutouts · Lightning Arresters · Oil Switches · Pole Line Hardware · Line Construction Specialties · Underground Equipment · Fibre Conduit · Street Lighting Equipment

LM

LINE MATERIAL COMPANY

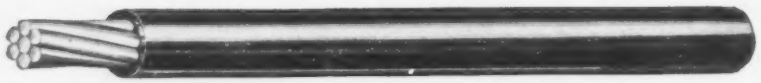
DISTRIBUTION TRANSFORMERS

• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

CRESCENT

SYNTHOL WIRES AND CABLES

for long service
under difficult conditions



SYNTHOL Type SN
SMALL DIAMETER BUILDING WIRE

is inherently moisture-resistant, oil, chemical and sun proof. It has the smallest outside diameter for a given copper size, permitting more conductors in a given size of conduit, is easy to fish, clean-stripping, SAFE and PERMANENT.

SYNTHOL Machine Tool and Control
WIRES and CABLES

The desirable characteristics of SYNTHOL insulation mentioned above are available in a wide range of sizes and number of conductors in permanent brilliant colors, which are completely oil proof.

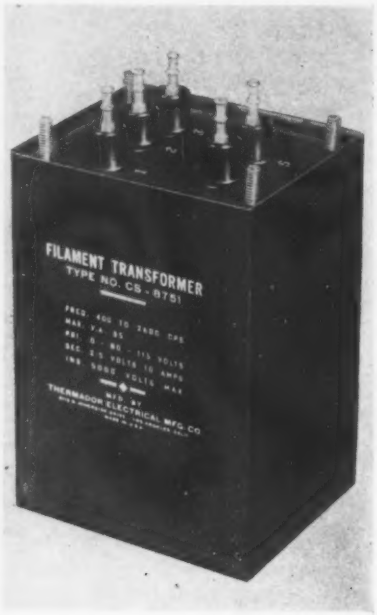
CRESCENT INSULATED WIRE CABLE CO.
TRENTON, N. J.

CRESCENT
WIRE and CABLE

PACIFIC TERRITORY SALES REPRESENTATIVES
Ray Murphy—720 East 2nd Street, Los Angeles, Cal.
Electric Agencies—562 First Ave., South, Seattle, Wash.

• BUILDING WIRE • SERVICE ENTRANCE CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • ARMORED CABLE •
• PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •
• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES •

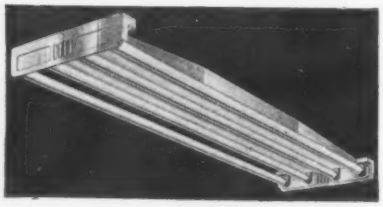
Transformer Line (404)



A line of transformers built on a new design has been announced by Thermador Electrical Mfg. Co. A feature in the construction is a method of attaching the cases to eliminate strain on the solder seal. According to the manufacturers, the new design will eliminate mechanical failure due to shock from temperature, humidity changes and vibration. The case is of steel and is rustproof; terminals may be of molded bakelite or glass; mounting bolts are welded gas tight.

Fixture (405)

Completing its new lightweight line, Edwin F. Guth Co. has announced an exposed lamp type fluorescent luminaire for offices and drafting rooms. The unit has a full top housing which totally encloses and protects accessories and wiring. According to the announcement, it reflects more than 75% of the light to the working plane and provides some upward illumination for ceilings. Units are 48 in. long and are available for two, three or four 40-watt lamps.



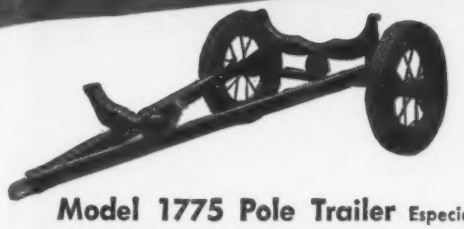
Pilot Light (406)

A pilot light for either panel or switchboard mounting has been manufactured by the H. R. Kirkland Co. and is being distributed by Graybar. The lamp, the standard S11 10-watt bulb, is so recessed into the unit from the front of the panel that the exposed tip has the appearance of a lens. This is said to give exterior ventilation, yet provide protection against breakage.

Insulating Varnish (407)

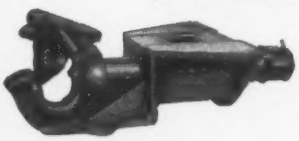
Sterling Varnish Co. has announced a new group of air-drying insulating varnishes designed for use in the manufacture and repair of electrical equipment.

FWD LINE CONSTRUCTION AND MAINTENANCE EQUIPMENT THAT CONSERVES CRITICAL TIME AND MAN-POWER

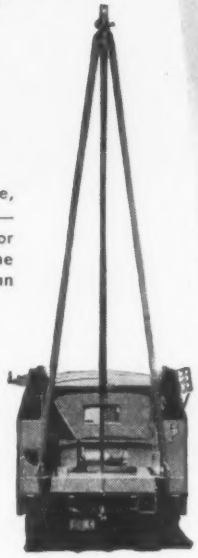


Model 1775 Pole Trailer Especially adapted for high-speed hauling of poles over short and long distances. Because of its wide tread, this unit trails at high speeds without snaking or whipping. Light in weight, two men can easily lift it onto a truck when moving from one operation to another.

Sure Binder (Handiest tool you ever used) The Sure Binder is a portable hand winch for binding bulky loads of all types. Ratchet type drum holds 18 ft. of 5/16 inch cable. Weight complete: 18½ pounds.



Utility Pintle Hooks Provide a sure, safe connection between truck and trailer — fit any make of truck. Available in sizes for pulling loads of 1 ton or less and up to the Universal type for towing anything that can be moved.



M Type Pole Derrick Made of the best seamless steel tubing properly heat treated. Available in sizes to handle poles from 25 ft. to 70 ft. in length.

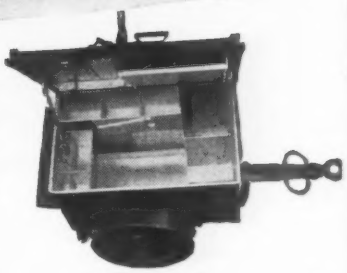
OTHER UTILITY TOOLS

- Earth Boring Machines
- Power Take-Offs
- Duct Rodding Machines
- Low Bed Trailers
- Trailer Hitches
- Cable Laying Plows
- Steel Utility Bodies For Pick-Up Trucks
- Guy Wire Forming and Cutting Tools

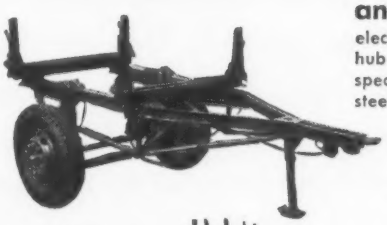
SEND FOR LITERATURE

First Choice OF MORE THAN 150 UTILITIES

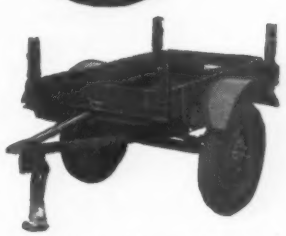
FWD offers a complete line of engineered trucks for Utility service. Special power take-offs for operating a winch and boring machine are incorporated into its original design. FWD builds its own cabs and Utility bodies—can furnish conventional or over-engine cabs with seating capacity from 2 to 7 men... Write for FWD catalog. "PUBLIC UTILITY TRUCKS THAT FOLLOW THE JOB."



Cable Splicer's Cart—Model S All steel construction—compact—rugged—theft-proof. Compartments for every tool. Folding support leg. Capacity 1000 lbs. Available with either solid or pneumatic tires.



Combination Cable Reel and Pole Trailer This unit has electric steel spoke wheels of integral hub type. Timken roller bearings, and special heat treated chrome vanadium steel springs. All castings are electric steel cast. Axle material is 40-50 carbon steel, specially heat treated. The main frame and cross member 4", 9½ lb. I-beam. All trailers furnished with one set of pole hauling bolsters, and one set of cable reel saddles.



Combination Cargo and Pole Trailer

P8T Series. Available in heavy load capacities of 3100 to 8200 lbs. Extension tongue permits hauling of poles up to 40 ft. Optional electric brakes, side boards, stanchions, etc.

B-6 All Purpose Body

A light weight compact all steel body designed for installation on any half ton chassis. Complete unit weight does not exceed 600 lbs. Storage compartments contain over 54,000 cubic inches. Full height clothing and material compartment. Corrugated steel floor, reduced weight increased strength. Full standardization of design permits easy replacement of damaged body parts or complete sub-assemblies. Tail gate can be secured at 45 degree position, level with floor or fully dropped. Rear ladder bracket removable. Telescoping door stops and solid wood insert converts upper rite door to full length work table and vise holder.

Distributed and guaranteed by GraybaR ELECTRIC COMPANY

THE UTILITY SUPPLY DIVISION of the FOUR WHEEL DRIVE AUTO CO. CLINTONVILLE WISCONSIN

★ ★ WAGNER PRODUCTS FOR VICTORY ★ ★

Wagner Unit Substations are doing their part in the production of steel, synthetic rubber, oil and other vital materials.

Wagner
UNIT SUBSTATIONS
PROVIDE LOAD CENTER CONTROL FOR LIGHTING AND POWER CIRCUITS

The Unit illustrated above is installed in a synthetic rubber plant. Each transformer has a two-position liquid-filled disconnecting switch on the high-voltage side which is equipped with low-voltage interlock. The low-voltage side is equipped with air circuit breakers electrically or manually operated, ground indication lights, voltmeters, ammeters, and ammeter test blocks. Each unit has one main breaker, one tie transfer breaker, and two feeder breakers.

MOTORS
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INDUSTRIAL BRAKES
BRAKE LINING

For Complete Information on Wagner Unit Substations write or phone the nearest Wagner branch office.

ARMY E NAVY

NATIONAL SECURITY AWARD

BACK THE ATTACK—
BUY U. S. WAR BONDS

T44-3

Wagner Electric Corporation
ESTABLISHED 1891
6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS

"SWINGING BUS" *proves highly satisfactory*

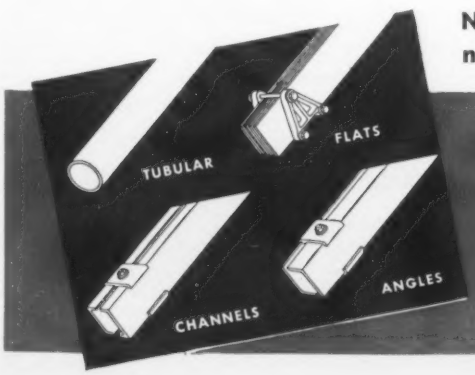
Buses are 5" aluminum channels, held face to face by welded-on spacers.

They're war workers, these Alcoa Aluminum buses, carrying power for vital production. Suspended from standard power-line insulators, with spans 24 feet rather than the usual 8 feet, costs were much lower than for rigid bus bar construction.

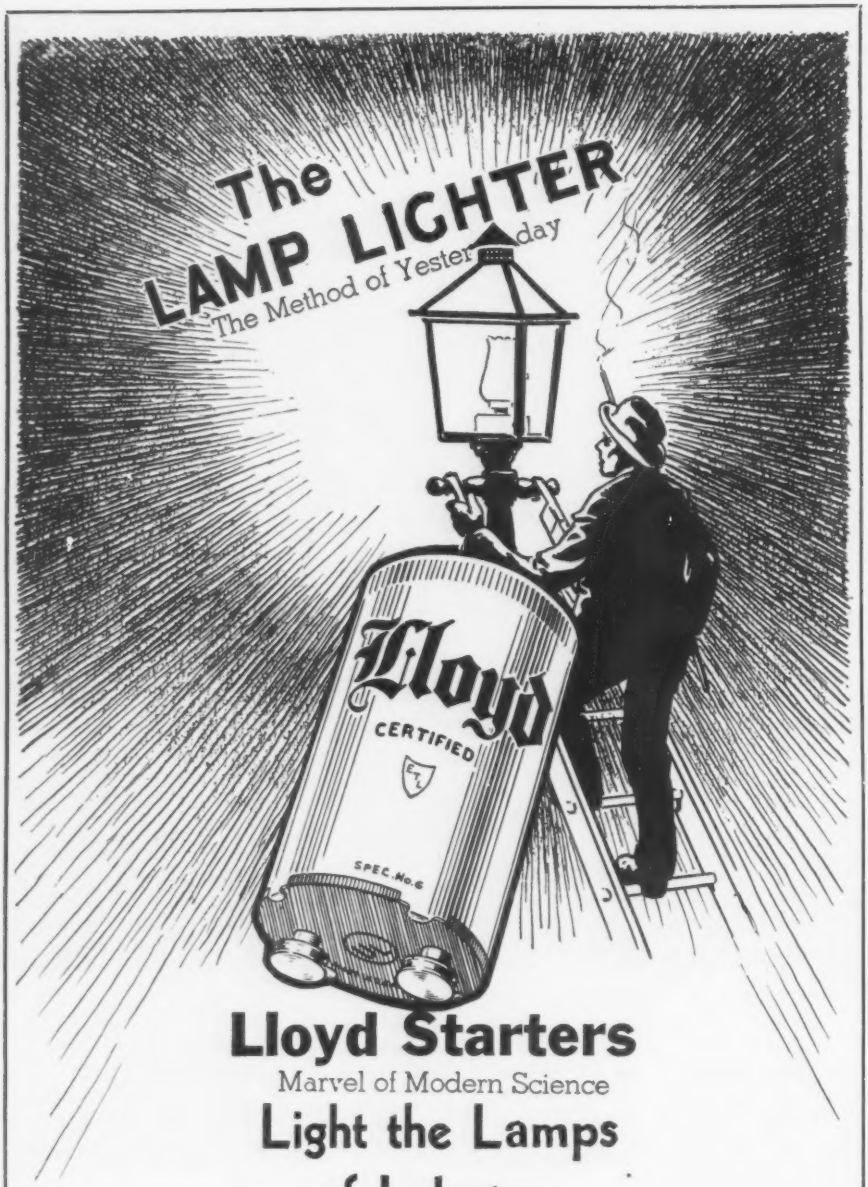
Buses are free to swing. The stiffness of the two Alcoa Aluminum channels comprising each conductor permits this long span design. The standard lengths supplied by Alcoa were welded at the joints to make each run a solid unit. The aluminum supplies the high electrical conductivity required.

Alcoa bus bars, Aluminum Cable Steel Reinforced, and fittings are available for essential work. If your power project has been approved, Alcoa can supply the necessary materials. With them, of course, goes the usual Alcoa engineering advisory service. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pa.

Note to manufacturers of electrical equipment: W.P.B. Order M-1-l now permits the use of aluminum for electrical conductors.



ALCOA
ALUMINUM



Lloyd Starters

Marvel of Modern Science

Light the Lamps of Industry

Engineered for perfection in quick, sure starting of fluorescent lamps, Lloyd starters are lighting the lights for millions throughout the country.

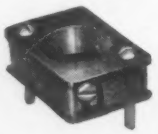
Their better performance is assured by specifications more rigid than accepted standards for material and design.

Tests conducted periodically by nationally known laboratories, confirm that the life and performance of Lloyd starters are far in excess of standard requirements.

Cat. No. 353
Lamp Holder and
Starter Socket

Lloyd Starters are listed and approved by Underwriters' Lab. Inc., and Canadian Eng. Standards Assoc. Certified by Electrical Testing Lab.-Spec. 6. Certified to Fleur-O-Lier standards.

Remote
Starter Socket



Cat. No. 352
Patent Nos.
D133267—2280747

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LLOYD PRODUCTS COMPANY

Dept. EW-4 Providence 5, R. I.

Representatives in 23 Leading Cities
Export Office: 13 E. 40th St., New York, N. Y.

Fluxed Wire Solder (408)

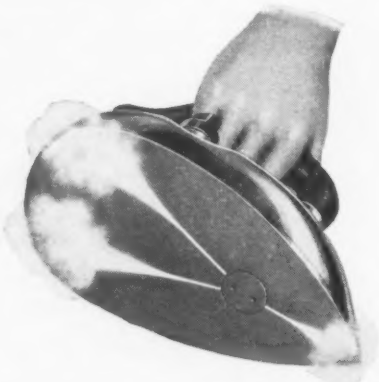
National Lead Co. is marketing a fluxed wire solder, containing flux in longitudinal grooves on the surface instead of in the conventional core. Called Fluxrite, the material is said to overcome a disadvantage of regular cored solders which supply flux and solder to the surface simultaneously. Since the flux in the new product is outside rather than inside, it liquefies and flows into the work before the solder melts, giving thorough fluxing. Other advantages claimed are continuous flow and constant visibility of the flux. Available in same diameters as cored solder and in two flux colors—red and green.

Light Beam Device (409)

A light-beam instrument for measuring either flux density or the total magnetic flux in magnetic circuits has been developed by General Electric Co. Similar to a light-beam galvanometer and with a suspension type element, this meter is said to be applicable wherever permanent magnets or d-c electro magnets are used. It is also stated that by use of search coils, a wide variety of magnetic measurements can be handled by the instrument. Diffierent sensitivities can be secured by utilization of galvanometers of various characteristics. Galvanometers are interchangeable and the instrument has a scale of 50 to 250 millimeters.

Steam Iron (410)

Silex Co. is advertising its automatic electric steam iron, which was in limited production before the war and will be on the market again when production can be resumed. Horizontal steam distribution is a feature of the iron.



Motor (411)

A motor that revolves 1,000 times a second has been designed by a Westinghouse engineer for use in airplane and tank production. It will provide direct drive for grinding wheels that put a mirror finish on hard-to-reach engine parts, eliminating the present method of pulley drive from larger, slower motors.

Wire Marker (412)

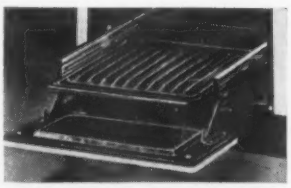
William Brand & Co. has a new tab type wire marker which it states was developed to provide for adequate identification on small diameter conductors. The marker possesses the resistant properties of standard varnished cotton tubing, according to the manufacturer.

NON-CLOG TOP BURNERS . . . of exceptionally high efficiency and economy; porcelain finished. Flame adjustable to any size utensil.

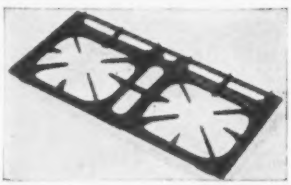
OVEN BURNER . . . operates on low heat and holds very low flame for slow cooking. Uniformity of heat results in perfect baking and roasting.

EASY-CLEAN OVEN . . . has smooth, one-piece interior of porcelain enamel. Rounded corners. Rack guides integral with oven lining.

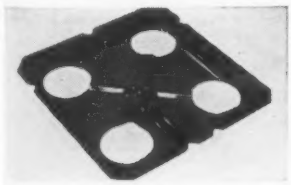
ROCK WOOL INSULATION . . . on sides, back, doors and top. Results in efficient oven heat, keeps kitchen cool.



SLIDE-OUT, DROP-FRONT BROILER . . . makes it easy to watch and control broiler. Gravy well in drip pan.



TOP GRATES . . . built in two sections for easy removal and cleaning. Finished in black porcelain enamel.



ONE-PIECE DRIP PAN . . . fits tight around burners, catching any spill-overs. Easy-to-clean black porcelain enamel finish.

Ready Now for Norge Dealers!

New Norge gas range (model GW-024) is *not* a make-shift or tide-over "Victory" model—it is full-quality merchandise, built as it will be built after the war, and is now available to Norge dealers in limited quantities!

We repeat: Here is a full-quality gas range, built of highest-grade heavy materials and to Norge precision standards. It definitely is *not* a tide-over "Victory" model, but is a permanent postwar product.

Check These Features

Special white vitreous porcelain exterior; non-clog top burners; automatic top burner lighter; low-heat oven burner; one-piece porcelain enamel drip pan; one-piece tank-type oven and broiler lining, each porcelain enameled; safety oven lighter; slide-out, drop-front broiler; full rock wool insulation; black recessed base; black plastic hardware.

The Norge model GW-024 range is adaptable to the use of bottled gas as well as artificial and natural gases (ask about model BGW-024). Norge distributors have complete specifications and prices.

"SEE NORGE BEFORE YOU BUY"

"...for outstanding production of war material."

NORGE

A BORG-WARNER INDUSTRY

NORGE DIVISION, BORG-WARNER CORPORATION, 670 EAST WOODBRIDGE ST., DETROIT 26, MICHIGAN

Only prewar producer of a complete line of **ROLLATOR REFRIGERATORS ★ ELECTRIC RANGES ★ WASHERS ★ GAS RANGES ★ HOME HEATERS ★ COMMERCIAL REFRIGERATION**

A Third CITATION

FOR THE INSTRUMENT LEADER

. . . FOR MERITORIOUS WAR PRODUCTION

This third citation for meritorious war production . . climaxing a long record of war service . . . is a source of justifiable pride to the men and women of WESTON.

The record began back in the earliest days of our defense period, when a large segment of WESTONS' capacity was assigned to the production of instruments vital to military needs. Thus, when we finally were forced into this world struggle, WESTON was ready for *full-scale war production.*

This new star which adorns our "E" pennant marks the *third* time WESTON has been *first* in this highly specialized field to receive each successive war citation. Weston Electrical Instrument Corporation, Newark 5, New Jersey.

Laboratory Standards . . . Precision DC and AC Portables . . . Instrument Transformers . . . Sensitive Relays . . . DC, AC, and Thermo Switchboard and Panel Instruments.

WESTON

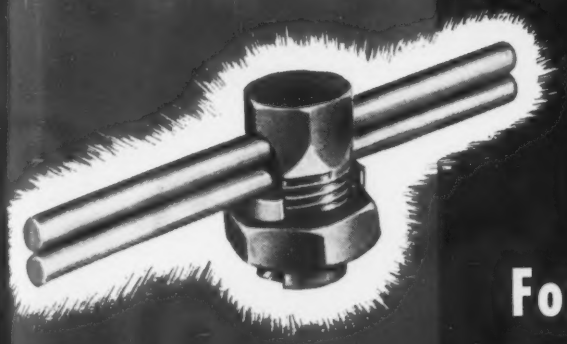
Specialized Test Equipment . . . Light Measurement and Control Devices . . . Exposure Meters...Aircraft Instruments... Electric Tachometers...Dial Thermometers.

FOR OVER 55 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

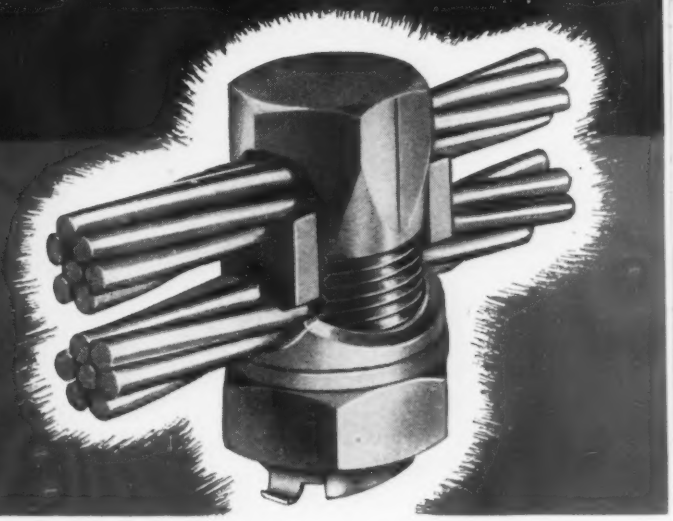
High Strength Factor Makes

KYLE CONNECTORS

Form Better Electrical Connections



Kyle Split Bolt Connector. This connector is of a two-piece compression type design that provides a safe and speedy means of making permanent connections in all cases.



Kyle "Perma-Lok" Connector. This connector is especially designed for use where vibration or other factors might cause loosening. The lock washer, fitted between the nut and the pad, insures a contact that is guaranteed to be permanently vibration proof.

KYLE Connectors are constructed of the most suitable alloys having high copper content resulting in high conductivity . . . make use entirely of machine cut threads on body and nut . . . are completely refinished overall. This results in a connector of the highest strength with resultant *higher permissible torque.*

Kyle Connectors produce the highest contact pressure between wires for any given tightening load on the wrench. *Higher pressure,* thus made possible, results in a *better electrical connection.*

Kyle connectors can be used again and again because the higher strength of materials and machine threads keeps the connectors from stretching out of shape.

Type of Kyle Connectors on which we are able to make immediate deliveries include:

Standard Split-Bolt Connectors for copper to copper connections. Sizes: From No. 8 solid wire to 1000 MCM. Stranded cable.

Standard Cadmium Plated Connectors for steel or aluminum connections. Sizes: From No. 8 solid wire to 1000 MCM. Stranded cable.

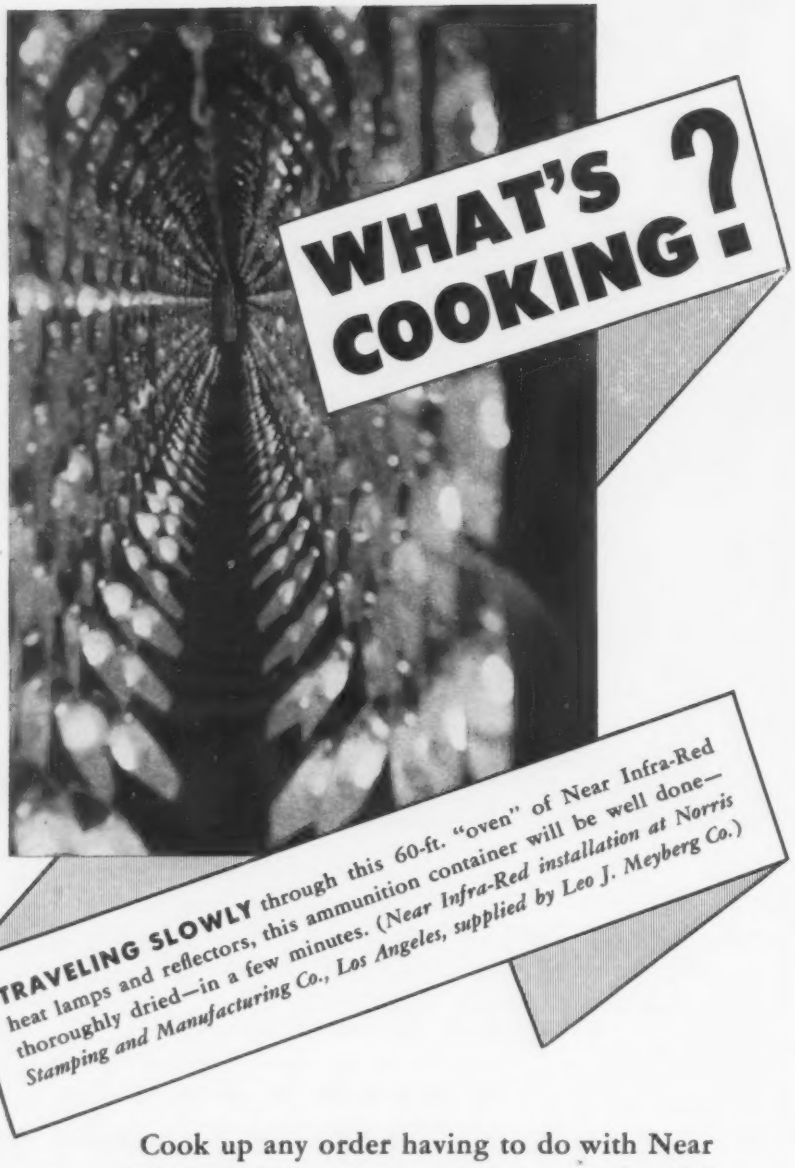
Standard Connectors with 2 Aluminum-Copper Bi-metal Washers for copper to aluminum connections. Sizes: No. 2 solid to 350 MCM. Stranded cable.

"Perma-lok" Connectors with lock washer and spacer for use with copper wires for ever tight connections. Sizes: No. 1/0 to 1000 MCM. Stranded cable.

KYLE CORPORATION

SOUTH MILWAUKEE, WISCONSIN

Kyle Connectors are sold exclusively through all branch offices and Representatives of the LINE MATERIAL COMPANY Milwaukee, Wisconsin


WHAT'S COOKING?
TRAVELING SLOWLY through this 60-ft. "oven" of Near Infra-Red heat lamps and reflectors, this ammunition container will be well done—thoroughly dried—in a few minutes. (Near Infra-Red installation at Norris Stamping and Manufacturing Co., Los Angeles, supplied by Leo J. Meyberg Co.)

Cook up any order having to do with Near Infra-Red heating equipment; Industrial Sound installations; Industrial Lighting applications; or electric and electronic supplies, and most likely Meyberg can fill the request.

Sometimes we can fill your order direct from stocks—the most complete in the West. If not, we know where, among our over 200 manufacturers, we can get what you want —and as quickly as conditions permit.

Our staff of experienced salesmen are ready to help you at the drop of a letter or the lift of a phone.

Try Meyberg service today!

LEO. J. MEYBERG CO.
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70 Tenth St., SAN FRANCISCO, 3 TELEPHONE UN 1212
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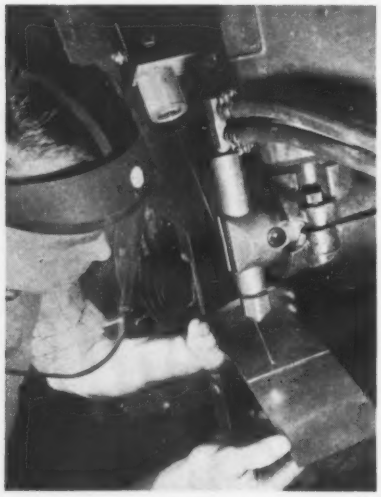
MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

Welding Spotlight (413)



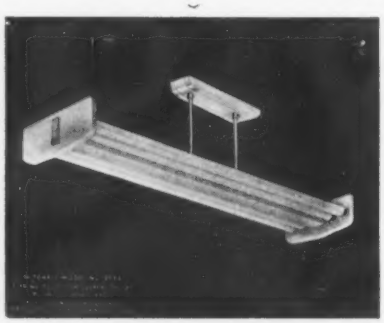
A tiny spotlight which throws a brilliant beam on the tip of the copper electrode of a resistance welding machine has been announced by Westinghouse. With this pinpoint of light directed on the part being welded, the operator does not need to raise his hood between each weld to position the rod. According to the manufacturer, the light cuts welding time 20% on most jobs.

Cold Cathod Unit (414)

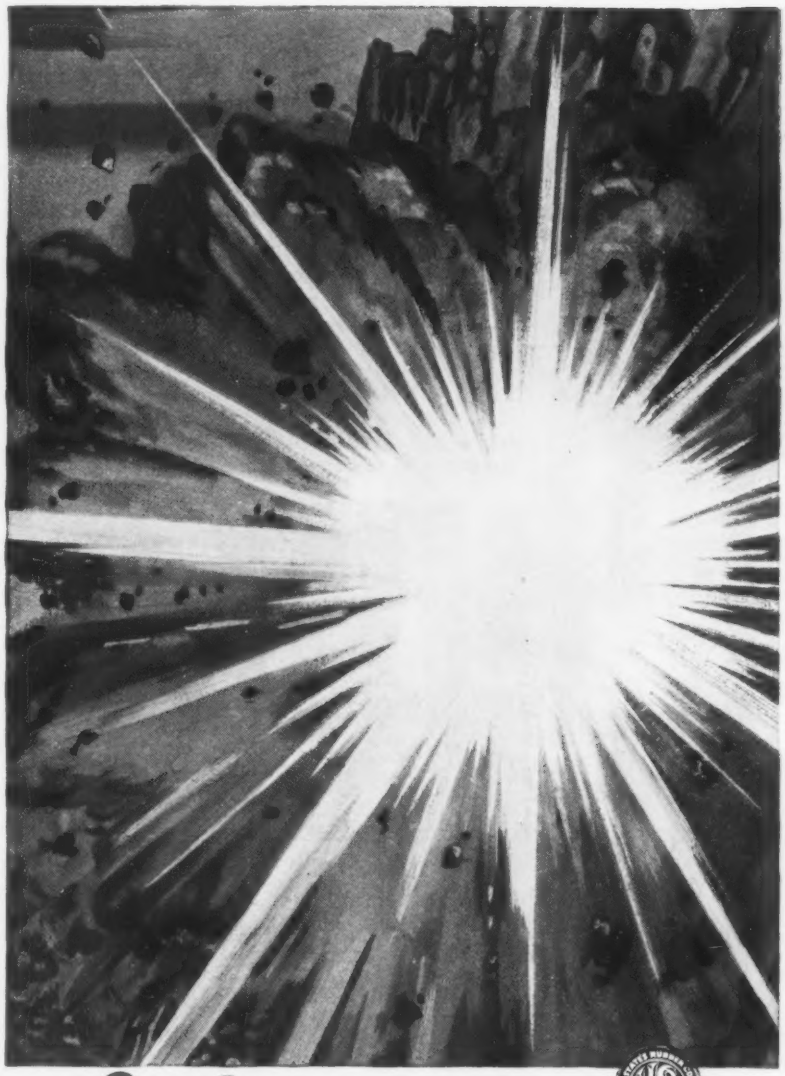
Mitchell Mfg. Co. has announced a new cold cathode fluorescent industrial lighting unit, called Kold-Volt. According to the announcement, this is a "standard package" unit for general industry use. In appearance and general lighting qualities, the lamps used in the new unit are similar to the conventional F type fluorescent lamps, except that they are 7 ft. 9 in. long, 1 in. in diameter and employ a different type of cathode at the tube ends.

Advantages claimed by the manufacturer include elimination of starters; instantaneous starting; average lamp life expectancy of 10,000 hours; operation at lower room temperatures; insensitiveness to line voltage variation; reduced maintenance; reduced glare.

Commercial Unit (415)



Mitchell Mfg. Co.'s new four-light commercial fluorescent fixture features a simplified method of hanging. Metal "tracks," furnished as standard equipment, are fastened to the ceiling, and the fixture slides into place on these tracks. Length of unit 49 in.; width 12¾ in.; height 5½ in; shipping weight 28 lb. Operates on 110-125 volts, 60 cycles a-c; higher voltages available.



WHEN A SHELL "WHUMPS" INTO THE EARTH...

...everything brittle for yards around may shatter.

That's why it's so important for the electrical insulation on wires and cables to retain its resiliency under all conditions of service. It does...on Laytex Wires and Cables... even when the weather changes from tropical heat to below zero within hours...also when subjected to continual vibration and repeated shock.

This enduring resilience of Laytex insulation is due to (1) The purified ingredients in the compound, (2) The unique process of building up a homogeneous insulation around the conductors by continuous dipping, drying, and vulcanizing. This combination results in perfect centering of conductors within an insulation so high in dielectric strength that the overall diameter can be appreciably reduced with safety.

Consequently Laytex Wires and Cables are lighter in weight, easier to handle, ship and store than those with conventional types of insulation...and they are also unaffected by long exposure to moisture.

Laytex ASSAULT WIRE SERVING THROUGH SCIENCE

SKI TROOPS USE Laytex Assault Wire for front line field telephones. On Detectors, Guns and Lights other types of Laytex Wire and Cable are used for power, signalling and control. Insulation of Laytex Wires and Cables withstands extremes of temperatures of all climates.

LAYTEX IS GLOBAL WIRE—All available facilities for producing U.S. Wires and Cables are still being devoted to the gigantic needs of the Armed Forces throughout the world.

We are repeatedly asked if we can furnish wire and cable for commercial and industrial uses. Not yet. But the time can't come too soon for us to resume peacetime manufacturing of Wires and Cables for Buildings, Police and Fire Alarms, Communications, Signalling, Power and Control.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

GENERAL ELECTRIC RESEARCH

Behind the scenes in G-E's Lamp Development Laboratory. Here engineers perform two of the many tests given General Electric's new lamp for instant-starting. At the left a cathode ray oscillograph test is in process, while the other engineer takes a reading on an automatic timing device that turns the lamp off and on more than 1400 times a day—to insure a high degree of dependability.

GENERAL ELECTRIC

DEVELOPS FLUORESCENT LAMP for INSTANT-STARTING!

New General Electric 40-watt Fluorescent Lamp Starts Instantly and Positively

Here is fluorescent lighting—at the flick of a switch! A fluorescent lamp that starts as instantaneously as an incandescent lamp!

General Electric soon will make available a 40-watt white G-E Mazda fluorescent lamp for operation with instant-starting ballasts. Shipments in limited quantities will start May 1st. New General Electric instant-starting ballasts will be made available at the same time by G-E's Transformer Section in Ft. Wayne.

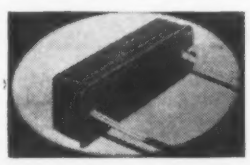
Instant-starting can be obtained with regular fluorescent lamps when used with an instant-starting ballast, but only at the cost of a substantial reduction in lamp life. The new 40-watt G-E fluorescent lamp operates on instant-starting ballasts *without sacrifice of rated lamp life.* It will sell for the same price as regular 40-watt G-E Mazda fluorescent lamps.

The new lamp, operating with a high voltage instant-starting ballast, eliminates the need for conventional starters. However, under abnormal operating conditions, such as high humidity, special provision may be needed to assure starting.

Another Example of G-E Leadership in Lighting

The development of the new fluorescent lamp for instant-starting is just one more example of the never-ending lighting progress led by General Electric lamp research. Through this research is assured the uniform quality and dependability that are characteristic of the complete line of General Electric Mazda lamps.

G-E High Voltage Ballast for Instant-Starting



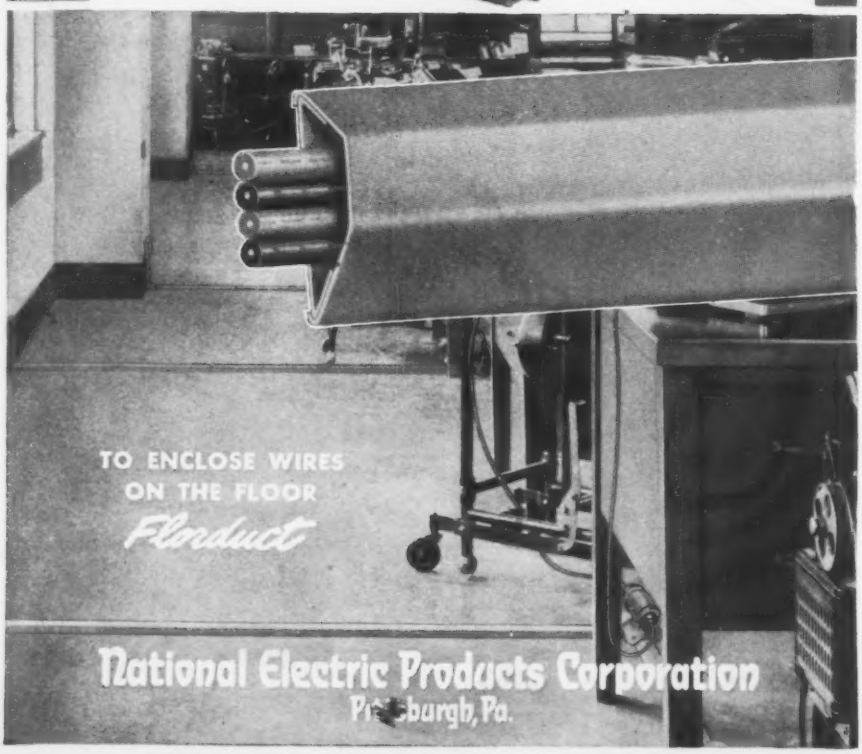
Latest development in the G-E Specialty Transformer laboratories at Fort Wayne is the new type ballast for use with instant-starting fluorescent lamps. Available in limited quantities about May 1st in four voltages with end out or base out leads. Rated life of the new fluorescent lamps when used with these ballasts is the same as that of regular G-E Mazda F lamps using the conventional switch and starter.

Hear the General Electric radio programs. "The G-E All-Girl Orchestra," Sunday 10 p. m. EWT, NBC; "The World Today" news, every weekday 6:45 p. m. EWT, CBS.

THE BEST INVESTMENT IN THE WORLD IS IN THIS COUNTRY'S FUTURE — BUY WAR BONDS

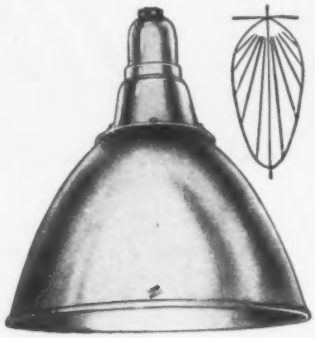
"TO MAKE LAMPS STAY BRIGHTER LONGER"
The Creed of G-E RESEARCH

G-E MAZDA LAMPS



High-Bay Lighting Units (416)

Edwin F. Guth has introduced a new line of aluminum high-bay lighting units featuring 30°, 60°, and 90° beam spreads. These units are said to provide 50° direct light cut-off and are available in sizes for 300 to 1,500-watt incandescent lamps and for 400-watt mercury vapor lamps. Reflectors are made of heavy-gauge aluminum, which has been released by WPB for such use.



Test Stand (417)

Airplane Mfg. & Supply Corp. has developed a test stand for Curtiss Electric propeller governors which it claims produces flight condition vibration. The device has an automatic control unit which allows the governor under test to control the speed of the driving unit. Driving power is from a 3-hp., variable-speed unit with a range of 900 to 3,600 rpm. A selector switch on the instrument panel enables the operator to choose automatic or manual operation. Lamps indicate opening and closing of the increasing and decreasing rpm. governor contacts during operation, and any grounded circuit in the governor.

Etcher, Demagnetizer (418)

Ideal Commutator Dresser Co. has announced a combination etcher and demagnetizer. Small tools and parts are etched by placing them on the work plate and turning switch "on" to proper heat. For parts too large for the work plate, a ground clamp is provided. There are 14 heats provided by "hi-lo" tap and seven-point switch. To demagnetize, the switch is turned to either No. 1 or No. 2 position, before proceeding as with an ordinary demagnetizer. Maximum rating is 5.5 amp. Over-all pole area is 13½ sq. in.

Electric Motor (419)

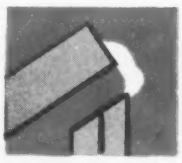
General Elecrtic Co. has built an electric motor which operates at 120,000 rpm. and will be used in war plants for grinding small holes. With normal voltage applied at 2,000 cycles, the new motor is said to reach full speed in less than one second. It is rated 3 hp. and weighs 7 lb. The standard 3-hp. 1,800-rpm. motor weighs 105 lb.

Paint Stripper (420)

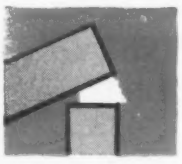
A blackout paint stripper developed by Turco Products, Inc., is said to cling without runs on any surface, permitting close control within a designated area. The product is described as a ready-to-use stripper for both asphaltic and non-asphaltic types of blackout paint.

arcs leave this point Fast!

A POINT TO REMEMBER!



LIKE THIS. Diamond-pointed break jaws confine arcing to the point . . . force the arc to break outside the current carrying area. Contact surfaces stay clean . . . don't pit, don't burn.



NOT LIKE THIS. When ordinary safety switches are opened, the arc leaps across the contact areas . . . along the jaws and blade. It hangs on longer, burns and pits the contact surfaces.

When arcs hang fire, switch contacts become pitted and burnt . . . cause trouble. To avoid this, keep the arc away from the contact area—*and* put it out *quick!*

Westinghouse Safety Switches do *both*. The diamond-pointed jaw forces the arc to break outside the current-carrying area. Contacts stay clean, last longer, need less care, provide better protection.

For 575 or 600-volt circuits, Westinghouse provides extra protection—the exclusive "De-ion" arc quencher. Arcs are drawn into the grid chamber—divided—quenched quickly!

Protect circuits with Westinghouse Safety Switches. Ratings up to 1200 amps, 600 volts. Call your Westinghouse Representative today. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Dept. 7-N. J-21299

Westinghouse SAFETY SWITCHES

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

STOCKS FROM 8 *Great Factories* UNDER ONE ROOF...

For your Electrical Production and Maintenance Needs

ESSEX WIRE CORPORATION

THE STEELDUCT COMPANY

OHIO CARBON COMPANY

TAYLOR FIBRE COMPANY

P. D. GEORGE COMPANY

BUNTING BRASS AND BRONZE CO.

HOMER COMMUTATOR CORPORATION

DIELECTRIC PRODUCTS COMPANY

and now,

PARANITE WIRE AND CABLE CORPORATION

Tri-State Supply Corporations represent eight large factories manufacturing a wide range of electrical equipment. And now, an additional plant has been added which enables us to render even greater service. Assembled under one roof, you will find wiring, winding necessities and vital parts for motors, generators, starters, transformers and relays; insulated wire of many types, commutators, brushes, resistors, varnishes, insulating tapes and paper, fibre, bearings and cambric insulation.

Tri-State can help you solve the problem of delivery by furnishing application and engineering data, by helping anticipate future requirements and by expediting actual deliveries. Wire or phone today for more details of Tri-State services and how they can be put to work for you.

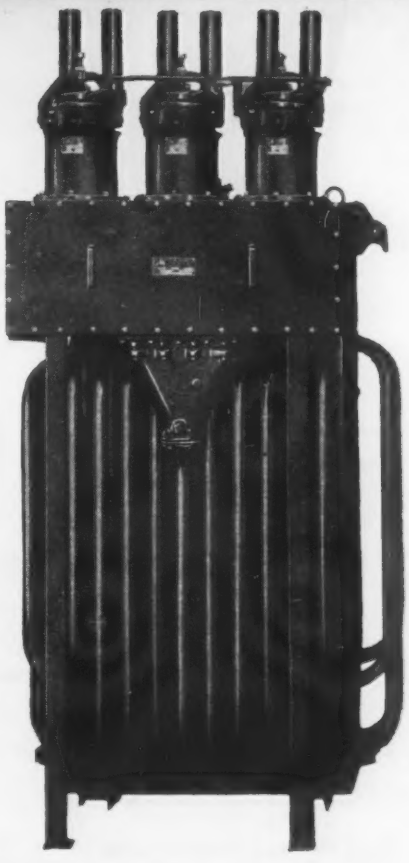
NOW AT 3 KEY LOCATIONS

TRI-STATE SUPPLY CORPORATIONS

LOS ANGELES 544 S. San Pedro St. MUtual 2354 • **SAN FRANCISCO** 554 Bryant St. EXbrook 8890 • **SEATTLE** 318 Occidental Ave. MA 7146

Another carload of Kuhlman Transformers on their way - to speed war production

KUHLMAN TRANSFORMERS HIGHLY REGARDED BY BOTH INDUSTRIAL AND UTILITY ENGINEERS



The three-phase, 60 cycle, 2400 volt primary OISC Kuhlman Transformers shown here are on their way to one of America's vital war plants. High voltage side is equipped with gang-operated oil fuse cut-outs. Secondary outlet is enclosed in a rectangular compartment with facilities for cubicle or duct installations.

No detail is overlooked in the mechanical or electrical construction of these power transformers. Tap changers, tap leads, frame, case, and all the other component parts are designed and built to easily withstand the stress and strain of constant heavy loads.

Hundreds of Kuhlman Power Transformers giving uninterrupted service year after year all over America provide the best proof of the durability and efficiency of these well-designed, well-built units. Write today for complete facts.

Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN

NO OTHER SWITCH HAS THESE TWO GREAT FEATURES

INSIDE—*note the trim compactness and ample wiring space.*

OUTSIDE — *modernly streamlined cover with rocker design handle.*

All BullDog Safety Switches have two important (and exclusive) advantages which assure more positive action, greater safety and longer life.

First, the Vacu-Break principle gives arcs no space in which to breathe — snuffs them out before they start.

Second, the Clampmatic mechanism — bolt-tight in the ON position—makes possible an easy, quick release when thrown OFF. This is accomplished by the energy stored in the clamp springs which help the handle operating spring "break" the contacts with almost automatic ease.

Send for descriptive Bulletin No. 415, giving complete information.

BULLDOG
ELECTRIC PRODUCTS CO.

BOX 177, R. PK. ANNEX
DETROIT 32, MICHIGAN
BullDog Electric Products of Canada, Ltd., Toronto, Ont.

Field Engineering Offices in All Principal Cities

ALSO MANUFACTURERS OF

SAFTOFUSE PANELBOARDS • SWITCHBOARDS • CIRCUIT MASTER BREAKERS • BUSTRIBUTION DUCT, *for "plug-in" power* • UNIVERSAL TROL-E-DUCT, *for flexible lighting* • INDUSTRIAL TROL-E-DUCT, *for movable "loads."*

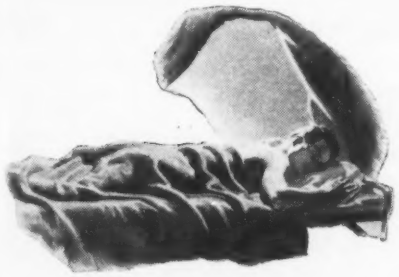
BUY MORE WAR BONDS

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224



Twice in a lifetime

He was just a little fellow a dozen years ago.

Too little to know — or care — that even as he slept, General Motors men in a distant laboratory were putting the finishing touches on a special new refrigerant later given the trade-mark, *"Freon."**

Much too little to understand that the real reason for developing this new compound was the safety of just such sleeping youngsters as himself.

That it was important because it provided the last link in perfect safety for home or hospital refrigeration, ending even the remote risk of toxic harm in the unlikely event of leaks in the cooling system.

He is grown now, and off fighting for his country on a South Pacific island.

He is old enough to know that one of his deadliest enemies there is the mosquito, carrier of malaria.

The interesting thing is that it is *"Freon"* that now comes to his aid. Twice in his lifetime, this one result of General Motors research is paying off in personal protection for him and his kind.

For when mixed with chemicals to kill mosquitoes, this compound makes a new and better kind of insect spray. Unlike heavier sprays that fall to the ground, it evaporates almost instantly, leaving the mosquito-killing compounds floating suspended in the air.

"Freon" was not developed as a war product. It came about because General Motors, seeking to provide more and better things for more people, never stopped trying to make better refrigerators for American households.

But because it was known and familiar, it was available when the war need appeared — just as it remains at hand for future peacetime developments.

The idea that built America — the idea that men accomplish most when they can win a just reward for doing great things — has served the country well in war.

And the same idea will keep on providing more and better things for more people in a world restored to lasting Peace.

*Trade-mark registered. "Freon" is made and sold by Kinetic Chemicals, Inc.

GENERAL MOTORS

"VICTORY IS OUR BUSINESS"

CHEVROLET • PONTIAC • OLDSMOBILE • BUICK
CADILLAC • BODY BY FISHER • FRIGIDAIRE
GMC TRUCK AND COACH

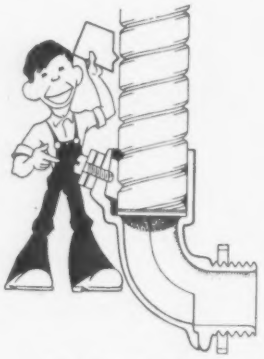
KEEP AMERICA STRONG
BUY WAR BONDS

T&B TITE-BITE CONNECTORS
Especially Designed for ARMORED CABLE

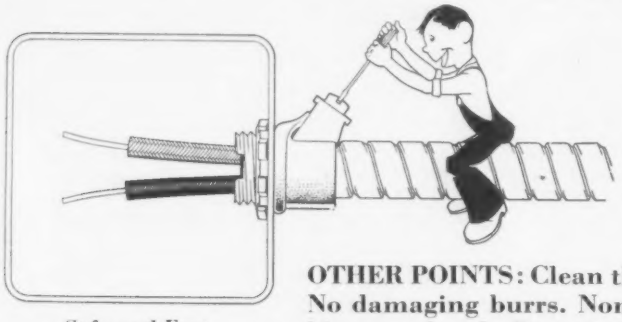
T & B Tite-Bites insure safe and speedy installations. They are tailor-made for work on all sizes of armored cable and flexible metallic conduit. Each connector takes several sizes. A small stock is all you need. Tite-Bites are particularly recommended for use in locations where vibration is constant. They're built to take it.

Note that the driving screw forces the teeth of the Tite-Bite onto the convolutions of the armor of the cable without spreading or injuring them in any way. The screw never touches the cable. Because the biting wedge is set at an angle, the harder the pull, the tighter the grip.

Tite-Bite Connectors are available in both Straight and Angle types.



The Teeth Make a Tite-Bite.



Safe and Fast Installation.

OTHER POINTS: Clean throats. No damaging burrs. Non-fumble screw heads. Precision sharp screw threads. Tite-Bites have full salvage value. Approved.

Order Tite-Bite Connectors from the stock of your local T & B Distributor through whom we distribute all our products exclusively. Because he reduces the manufacturer's selling costs, the distributor thereby reduces the cost of all electrical material to the user. Call on his organization for quick and competent service.

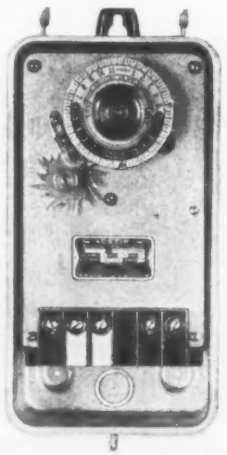
WRITE TODAY FOR TITE-BITE BULLETIN 15

THE THOMAS & BETTS CO.
INCORPORATED
MANUFACTURERS OF ELECTRICAL FITTINGS SINCE 1899
ELIZABETH 1, NEW JERSEY
In Canada: Thomas & Betts (Ltd. Montreal)

E Flag awarded April, 1943
White Star awarded October, 1943

Time Switches (421)

The M. B. Austin Co. has added a line of time switches. Included are a standard synchronous indoor model, with straight "on" and "off"; a heavy-duty synchronous switch for hard service straight "on" and "off"; poultry house lighting controls; one-day program synchronous switches for direct 24-hour control; a seven-day calendar dial synchronous model, providing individual daily settings.



Coatings (422)

DuPont has a new ceramic type composition which it claims produces electrically conductive coatings that may be applied to a wide variety of non-conductors including glass, plastics, porcelain, soapstone, wood, cloth and paper. These new coatings can be applied to non-conducting base materials by spraying, dipping or brushing, followed by air drying and, in some cases, baking, it is stated. Several different formulations of the material are being produced, each designed to meet varying requirements of different base materials and degrees of adherence and film toughness. The coatings are dull, metallic gray.

Blower (423)

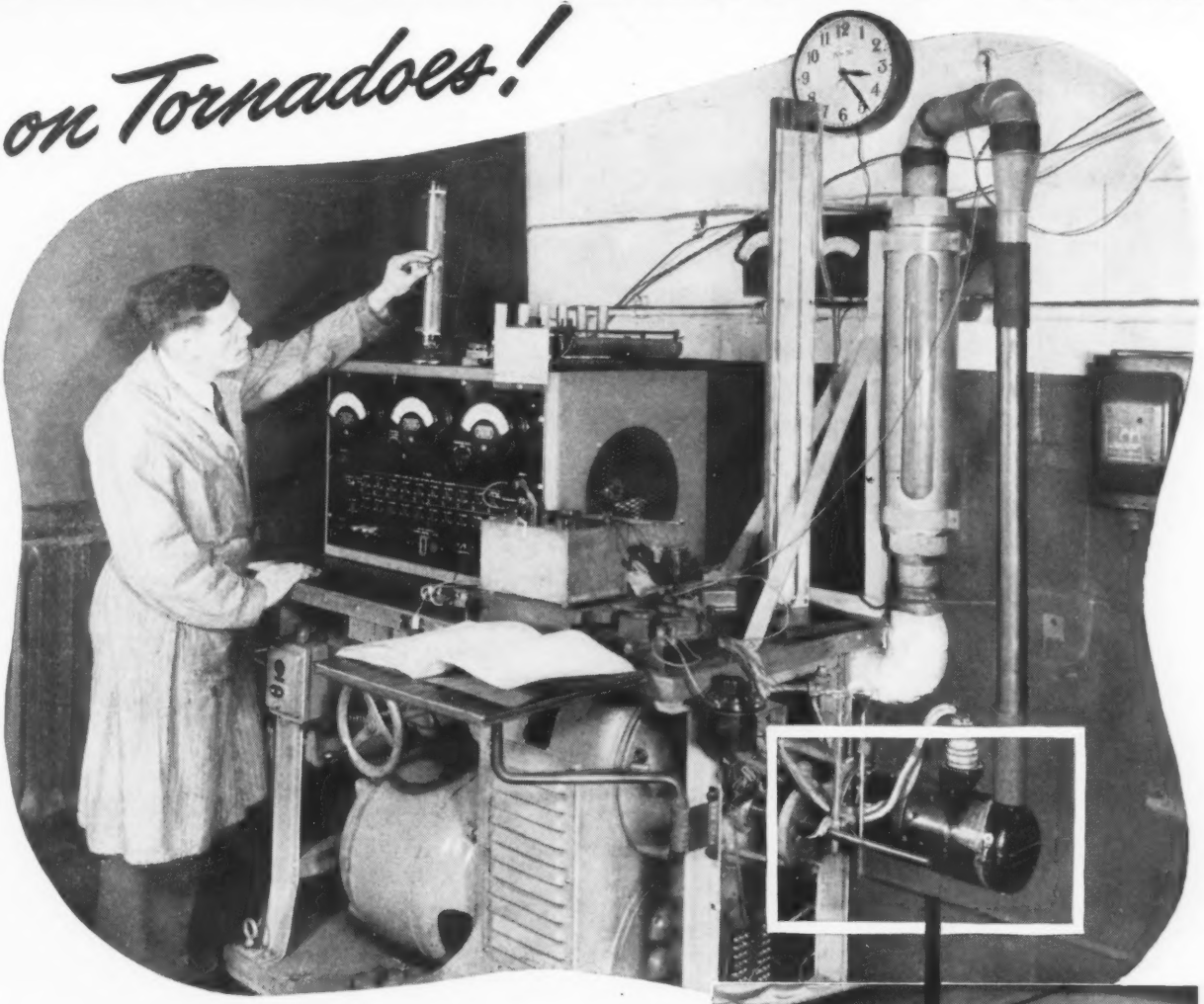
The Electric Ventilating Co. has announced an all-purpose blower which it claims makes available a wide variety of special mountings on a mass production line of blowers. Eight different arrangements available are blower only; blower and stand; blower and inlet flange; blower and discharge flange; blower, inlet and discharge flange; blower, stand and inlet flange; blower, stand and discharge stand; blower, stand, inlet and discharge flanges. Power is from a series wound, 110-volt, single-phase, 60-cycle, sleeve bearing type a-c motor, operating at 3,400 rpm.

Checking Device (424)

A device to check accuracy of thread gauges, lead screws and racks to about twelve millionths of an inch has been developed by Sheffield Corp. and Westinghouse. The design utilizes an amplifier to magnify movements of the stylus so it can be read on the scale of a milliammeter. Power is obtained from a 115-volt 60-cycle, single-phase circuit. An automatic stabilizer prevents voltage variation from affecting quality of results, it is reported.

MAKING AIRPLANE GENERATORS THRIVE

...on Tornadoes!



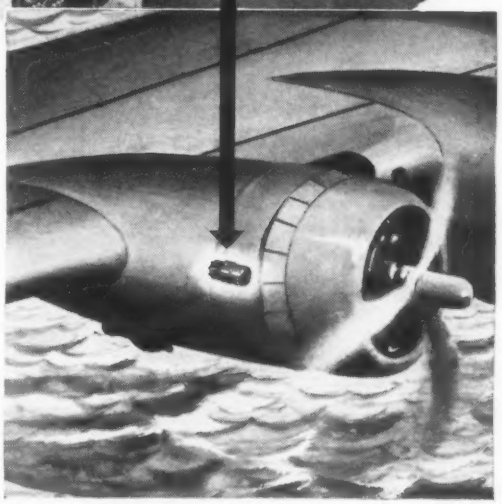
One reason why National Carbon research develops brushes that meet severest operating conditions:

THE BRUSHES that can take the punishment . . . at the highest altitudes of modern aerial warfare . . . passed their *low-altitude* tests on the stand shown above. This stand forces a veritable tornado of *accurately metered* air through a heavy-bomber generator working at rated capacity, measuring brush and generator operation under perfectly reproduced sea-level flight conditions.

The perfection of new high-altitude brushes again proves the ability of National Carbon Company's Research Laboratories staff to develop brushes of all types and for all duties . . . from locomotive motors and giant turbo-electric generators, to small, fractional horsepower units.

Research, experience, and cooperation in solving customers' problems have given "National" brushes undisputed leadership . . . have made them available in the proper grade for every application.

We invite you to bring your brush problems to us. If you have not received copies of "Modern Pyramids"—on brush principles and care—write National Carbon Company, Inc., Cleveland 1, Ohio, Dept. 17D.



THE GENERATOR shown here weighs only 42 pounds, yet develops 200 amperes at 30 volts . . . rating contingent on air-blast cooling.

★ *BUY UNITED STATES WAR BONDS* ★

The word "National" is a registered trade-mark of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

CARBON PRODUCTS DIVISION, CLEVELAND 1, OHIO UCC New York, Pittsburgh, Chicago, San Francisco

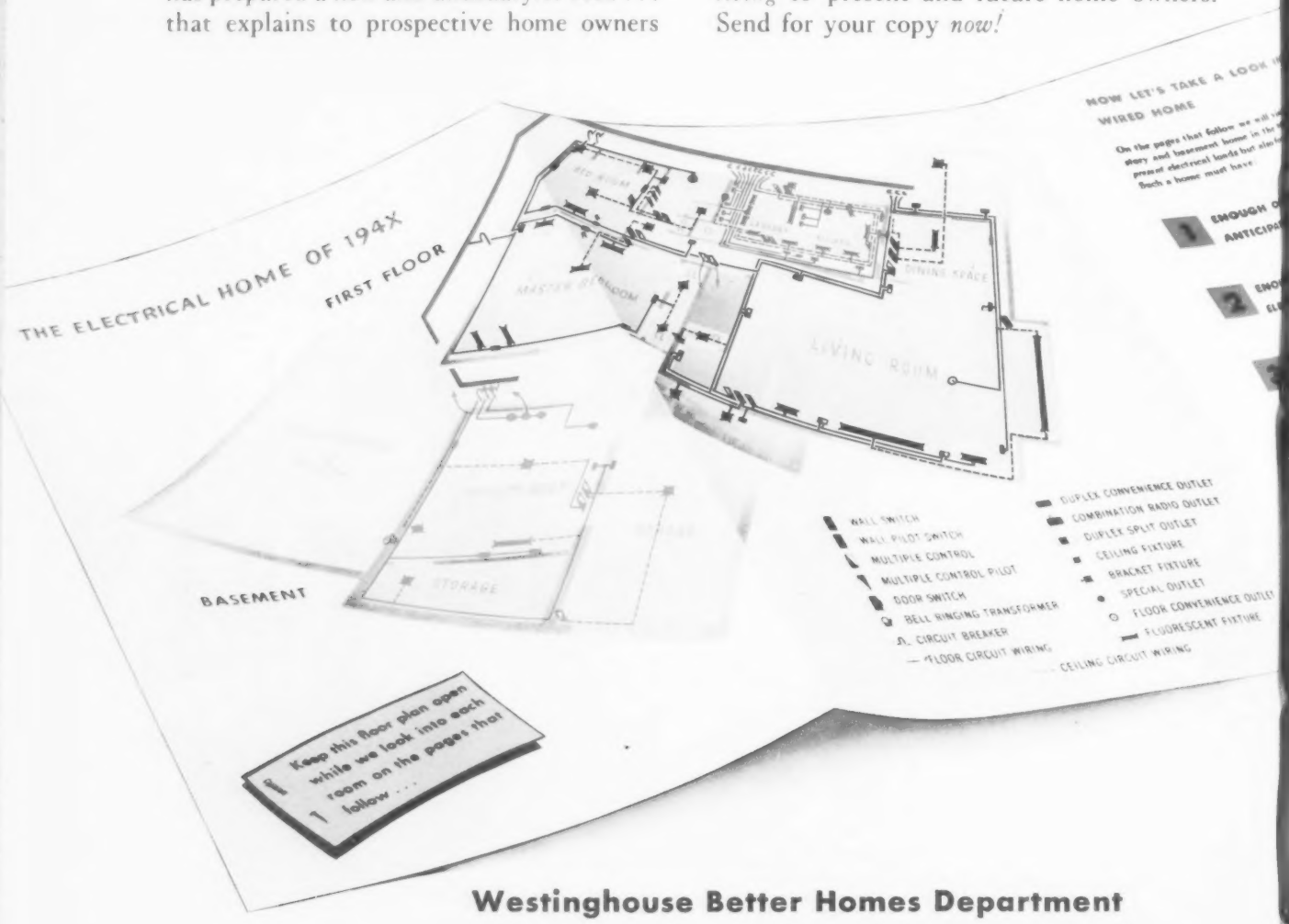
THE MOST COMPREHENSIVE BOOK

"Electrical Living in 194X"

Are you planning ahead for the *greatly increased electrical loads* that household appliances and equipment will bring in 194X?

To help you in your postwar planning, the Westinghouse Better Homes Department has prepared a new and unusual *free book* . . . that explains to prospective home owners the urgent need for *better wiring* in their future homes.

We are confident that you will find in "Electrical Living in 194X" a valuable tool for selling the idea of *better wiring for better living* to present and future home owners. Send for your copy *now!*



Westinghouse Better Homes Department offers new "Six-Point Advisory Service"

The Better Homes Department welcomes the opportunity of giving authentic technical information on the *proper applications of electricity* which will contribute so much to better living in 194X.

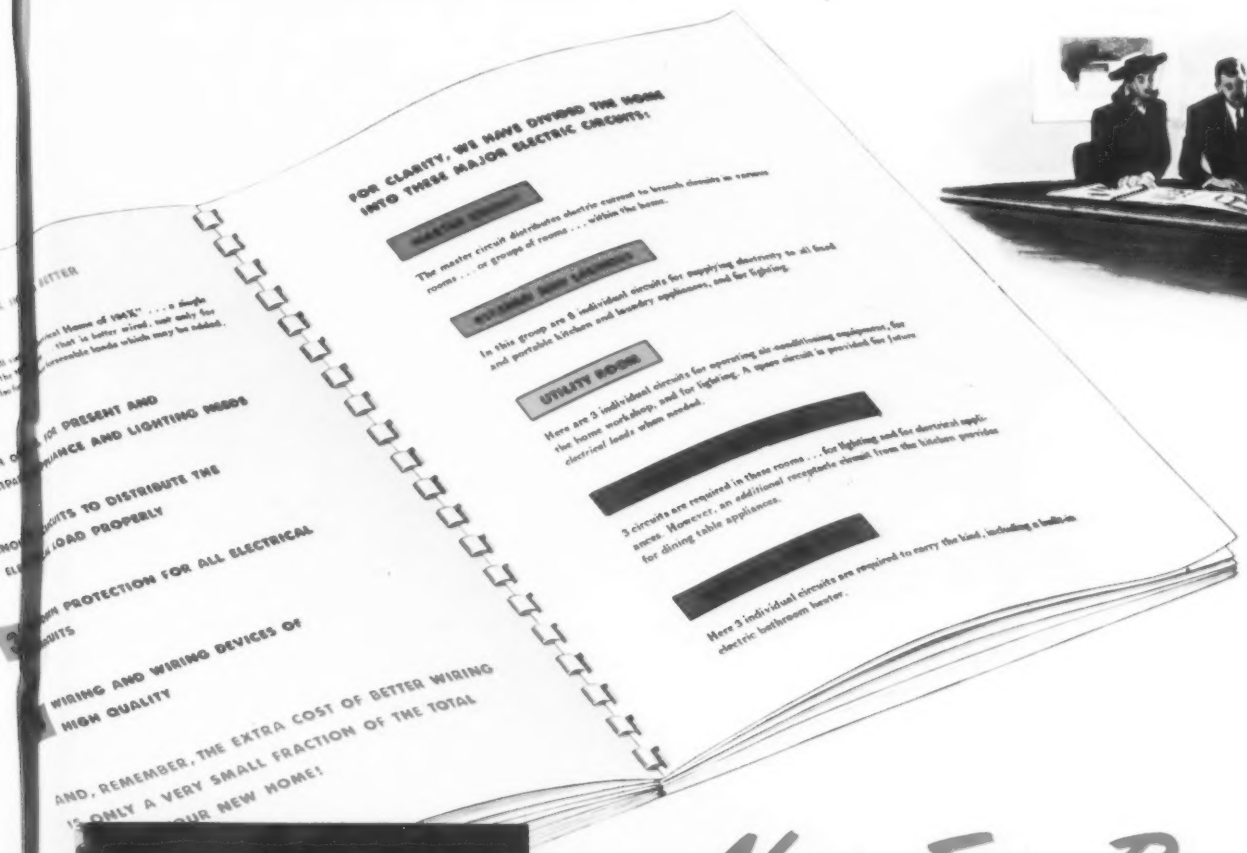
This Six-Point Advisory Service includes free advice on the following important subjects:

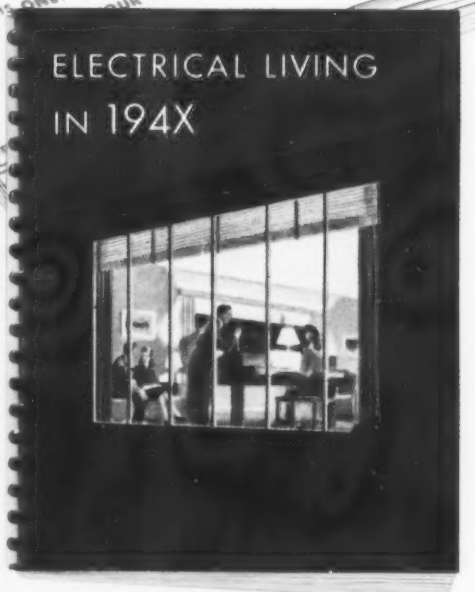
1. Selection of correct types of electrical equipment for various classes of postwar homes.
2. Location and arrangement of fixed equipment, for conserving space and attaining maximum efficiency in arrangement of kitchen and laundry work cycles.
3. Accurate dimensions and clearances of equipment to insure proper installation and efficient operation.
4. Access for servicing of equipment—so necessary for periodic inspection and repair.
5. Location of lighting outlets and controls, for greater enjoyment, comfort, and safety in the home.
6. Utility service connections—including location and size of electric wiring, water supply, and drainage lines.

If you have any problems relating to the selection, installation, and use of home electrical equipment, write: Better Homes Dept., Westinghouse Electric & Mfg. Company, Pittsburgh 30, Pa.

Tune in John Charles Thomas, NBC, Sundays, 2:30 p. m., E.W.T. and "Top of the Evening" Monday—Wednesday—Friday Blue Network, 10:15 p. m., E.W.T.

OF ITS KIND EVER PUBLISHED!


FOR CLARITY, WE HAVE DIVIDED THE HOME INTO THREE MAJOR ELECTRIC CIRCUITS:
The master circuit distributes electric current to branch circuits in rooms . . . or groups of rooms . . . within the home.
In this group are 8 individual circuits for supplying electricity to all fixed and portable kitchen and laundry appliances, and for lighting.
UTILITY ROOM
Here are 3 individual circuits for operating air conditioning equipment, for the home workshop, and for lighting. A spare circuit is provided for future electrical loads when needed.
3 circuits are required in these rooms . . . for lighting and for electrical appliances. However, an additional receptacle circuit from the kitchen provides for dining table appliances.
Here 3 individual circuits are required to carry the load, including a built-in electric bathroom heater.
FOR PRESENT AND
WIRING AND WIRING DEVICES OF HIGH QUALITY
AND, REMEMBER, THE EXTRA COST OF BETTER WIRING IS ONLY A VERY SMALL FRACTION OF THE TOTAL



This new book is offered to the building profession, and allied interests, as a contribution of the Westinghouse Better Homes Department to the greater enjoyment, comfort, and convenience of home owners in 194X.

New Free Book

tells all about

"BETTER WIRING FOR BETTER LIVING"

"Electrical Living in 194X" takes the prospect on a *personally conducted tour* through a completely electrified postwar home!

It pictures and describes the wiring circuits and electrical appliances in the home of the future . . . in kitchen, laundry, utility room, living and dining rooms, and bedrooms and bath.

This colorful, 64-page book tells all about electrical loads in the 194X home, lighting and lighting controls, circuit protecting devices, entrance equipment, and distribution panels.

"Electrical Living in 194X" also contains valuable technical information on the *application and installation* of fixed and portable electric home appliances.

"Electrical Living in 194X" will be ready for distribution soon. The supply is limited. Be sure to get your copy, by returning the coupon *today!*

Westinghouse

Plants in 25 cities *Offices Everywhere*

MAIL COUPON TODAY!

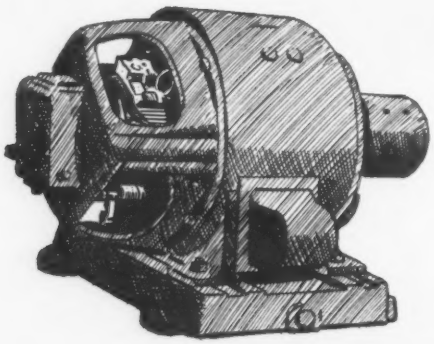
Better Homes Department C 1 2 3 4 5
Westinghouse Electric & Manufacturing Co.
306 Fourth Avenue, Pittsburgh 30, Pa.
Please send my *free copy* of "Electrical Living in 194X"

NAME _____

POSITION _____

FIRM _____

ADDRESS _____



Your choice of a lubricant can mean a difference in horsepower

Electric motor ball bearings attain much higher velocities than do the motors themselves. It is important, therefore, that these bearings spin with as little friction as possible—so important, in fact, that the internal friction or torque characteristics of the bearing grease itself are matters to reckon with in figuring delivered horsepower and operation costs.

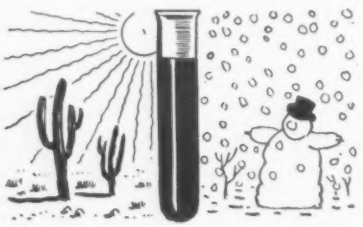
With an improper bearing grease, the internal friction set up *in the grease itself* causes load strain on the motor. For example, stringy, long-fibered greases become wedged between the balls and restrict the spin of the bearings.

In designing a grease to meet the special needs of ball bearing lubrication, Union Oil Company's research engineers continually tested for torque properties until they developed a grease with a minimum of resistance.

This grease is *Ballroll.*

Ballroll shears readily, allowing bearings to spin freely and instantly, and due to its smoothness actually permits the motor to deliver more horsepower.

Ballroll will not melt and run out of bearings at high temperatures. It will not "gum up," evaporate or



separate. It does not harden with cold or thin out with heat. It forms a protective coating over the working parts, effectively sealing out abrasive grit and dirt.

Ballroll Grease is typical of the efforts made by Union Oil Company engineers to understand and de-

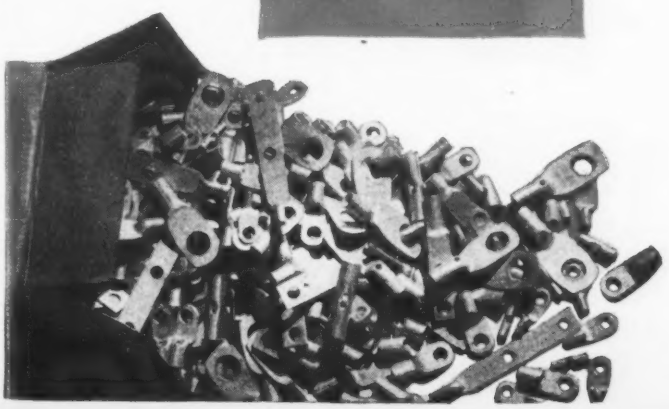
velop solutions to the petroleum needs of industry.

For a superior type of ball bearing grease, phone your nearest Union Oil Resident Manager for a supply of Ballroll.

BALLROLL GREASE

Another
UNION OIL
Success-Tested Product

The Tool you'll soon *connect with!*



The torch bows out. Today, small wires are terminated or linked together simply by *Indenting* the connector to the wire with the Burndy HY-TOOL. Speedy and simple . . . *for no torch, no fuel, no acid are necessary.*

But the *big* feature is that simple Indenting *eliminates faulty connections.* Note the cross-sectional view at the left . . . showing how connector and conductor have been *permanently joined* by indenting with the HYTOOL. *The connection is on to stay!*

It's a better electrical conductor, too; since the Burndy HYDENT connectors used are of one-piece, pure copper construction. *No seams or joints to loosen, or increase resistance!*

Why not have the complete story on this modern connecting method at your fingertips. The Burndy HYDENT Catalog, available on request, gives complete details.

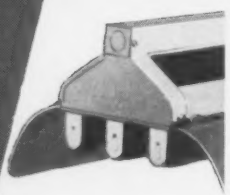
Headquarters for connectors

Burndy

BURNDY ENGINEERING CO., INC.
107 EASTERN BOULEVARD, NEW YORK 54, N. Y.
IN CANADA: Canadian Line Materials, Limited, 13

Although our facilities are devoted to war production, Smoot-Holman still manufactures a full line of industrial and commercial lighting equipment for essential business.

Our production is concentrated on the Pacific Coast, eliminating cross-country shipping, and assuring a more immediate and dependable supply.



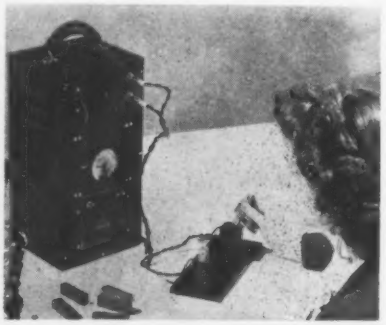
Sight-Craft lighting fulfills every requirement for better illumination, whether your needs are for conventional reflectors and luminaries, or for modern fluorescent equipment.

SMOOT-HOLMAN COMPANY
SIGHT-CRAFT
INGLEWOOD CALIFORNIA
MADE IN U.S.A.

SMOOT-HOLMAN
COMPANY
INGLEWOOD, CALIFORNIA

Magnetic Comparator (425)

General Electric Co. has announced a magnetic comparator for controlling the quality of ferrous parts of the same size and shape. When the part to be tested is placed in a coil which has been balanced electrically against a standard part, the new comparator detects any difference in the two parts which



changes the magnetic flux linking the coils surrounding them. The difference is shown as unbalance on the comparator's indicating instrument, which reads within passing limits when the tested part is acceptable.

The comparator consists of a variable-voltage transformer, a sensitivity control rheostat, coarse and fine balance control rheostats and required capacitors, all mounted in a portable, steel case. The zero-center indicating instrument, control knobs and necessary switches are on front of the panel. Two air-core coils are furnished as test fixtures but, where surface conditions permit and the parts are too large for suitable coils, two gauge heads can be furnished.

Electronic Tester (426)

General Electric has developed an electronic tester for production line testing of faulty insulation and winding dissymetries in motors, generators, coils and transformers.

The new instrument employs the principle of balance and comparison and tests simultaneously turn-to-turn, coil-to-coil and coil-to-ground insulation. It simulates qualitatively such procedures as resistance, impedance-balance, turn-balance and complete high-potential tests with one voltage application.

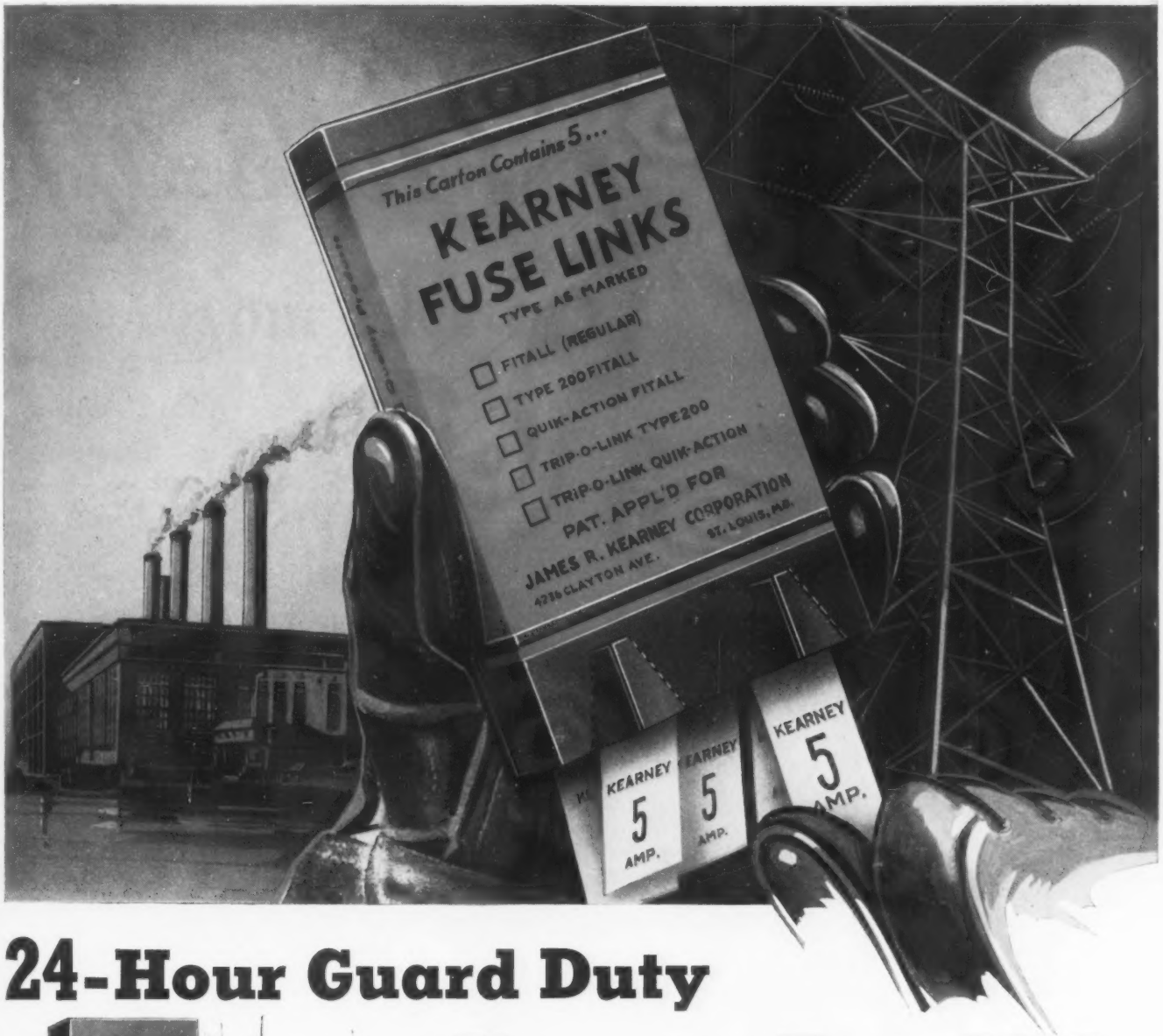
The tester includes a repeating type, surge-voltage generator, a cathode-ray oscilloscope and synchronously driven switching equipment, enclosed in a steel cabinet designed for bench mounting. Adequate safety protection has been provided, it is stated.

Winding Tape (427)

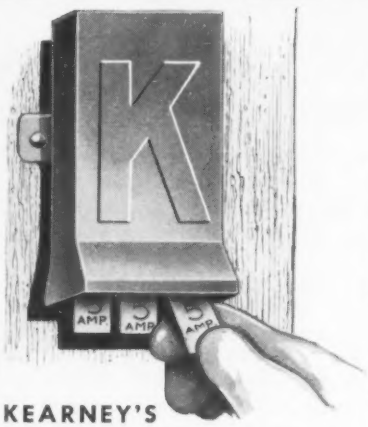
William E. Wright & Sons announce that a new type of construction in 10-mil thickness Kappa cellulose acetate rayon coil winding tape gives approximately 52% greater tensile strength. Average breaking load of 10-mil samples, 1 in. wide, was 71.2 lb., according to the announcement. Tapes are available in standard widths from $\frac{1}{4}$ to $1\frac{1}{2}$ in. and in consistent 3-, 5-, 7- and 10-mil thicknesses, it is stated.

Twist-Lock Receptacle (428)

Wiremold has a new two-terminal midget twist-lock receptacle for installation in its No. 2100 Plugmold, a wiring system for plugging in industrial applications along work benches, inspection racks and assembly lines. Available 15 amp., 125 volts; 10 amp., 250 volts.



24-Hour Guard Duty with Kearney Fuse Links



KEARNEY'S
FUSE LINK DISPENSER
Gives You
THE RIGHT LINK
at the RIGHT PLACE
at the RIGHT TIME

LIKE a Defense Plant watchman Kearney Fuse Links stand 24-hour guard duty over your lines. More than ever before overloaded lines in these 24-hour days need accurate and unfailing protection.

Kearney Fuse Links are designed to discriminate between equipment damaging faults and harmless transients. A switching surge, a dragging overload, a dead short-circuit or a lightning stroke, each representing a different protection problem, all come within the scope of a properly chosen Kearney Fuse Link.

Let Kearney Engineers Solve Your Fusing Problems.

The Mark of JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *Quality Products*

MADE BY **JAMES R. KEARNEY CORPORATION**

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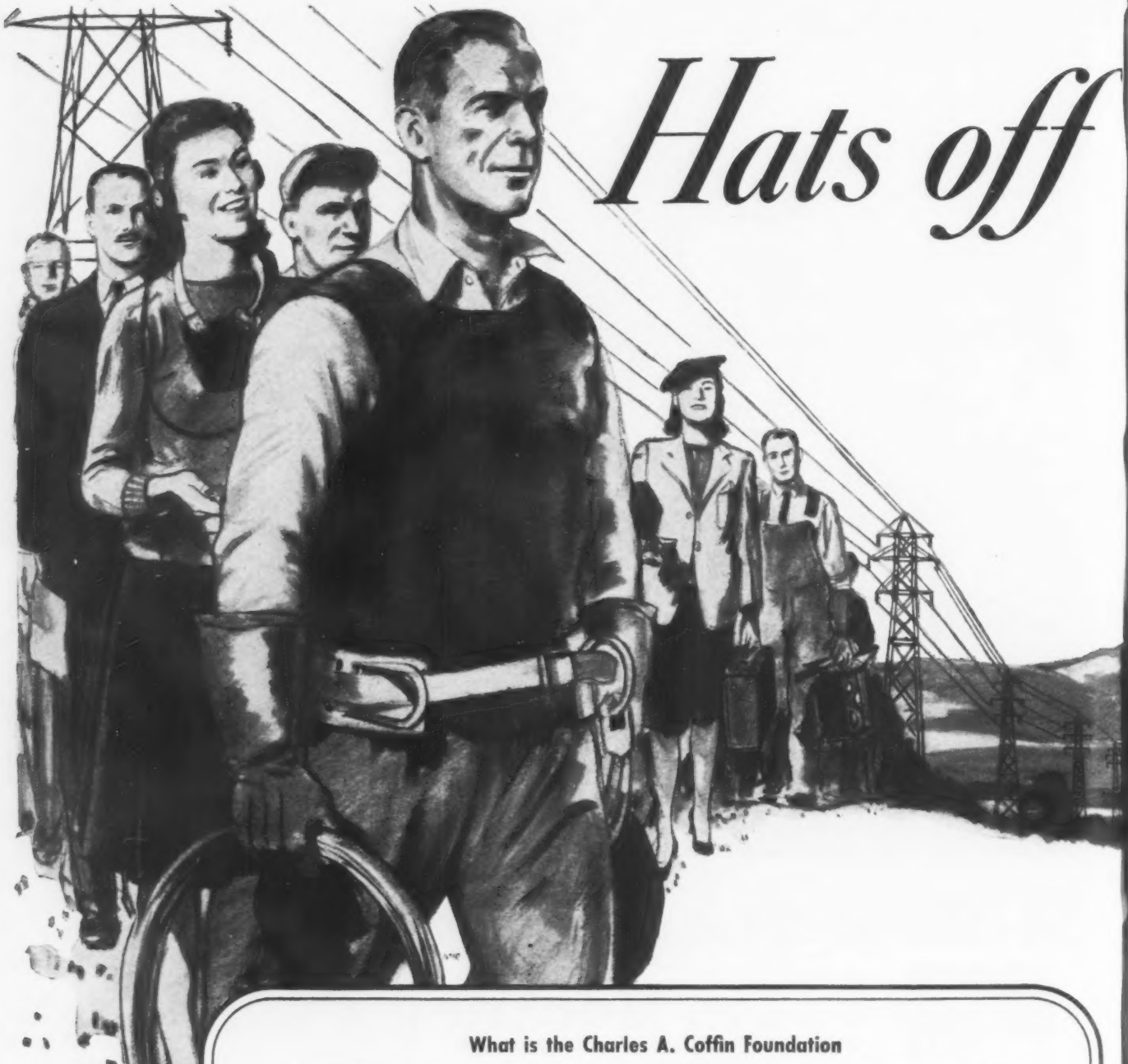


Hats off

What is the Charles A. Coffin Foundation

THE PURPOSE of the Charles A. Coffin Foundation is to encourage and reward distinguished achievement in the electrical field by "prizes to employees; by recognition to lighting, power, and railway companies for improvement in service to the public; by fellowships to deserving graduate students; and by the grant of funds for research work at technical schools and colleges."

Establishment of the awards was announced twenty-two years ago in a statement issued by President Swope and dated December 2, 1922:

"On May 16, 1922, Charles A. Coffin in his 78th year retired from the active leadership of the General Electric Company. Mr. Coffin has been identified with the development of the electrical industry since 1882. He was the founder and creator of the General Electric Company, of which he has been the inspiration and leader for thirty years.

"As an expression of appreciation of Mr. Coffin's great work not only for the General Electric Company but also for the entire electrical industry and with the desire to make this appreciation enduring and constructive as Mr. Coffin's life and work have been, the Board of Directors of the General Electric Company created on his retirement and now desires to announce the 'Charles A. Coffin Foundation.'"

GERARD SWOPE, *President*

Invest in Your Country's Future—BUY WAR BONDS

This advertisement is appearing in more than 200 daily newspapers during the week of March 13, and in 1490 weekly newspapers during the month.

to the People who Produce your Electric Light and Power

The Charles A. Coffin Foundation
confers a special citation for
distinguished wartime achievement
on the
ELECTRIC LIGHT AND POWER INDUSTRY

"Faced with unprecedented demands, the Electric Light and Power industry has met every war-production requirement without delay and without impairment of its peacetime services to the public. This achievement merits the appreciation not only of American industry but of the entire nation."

—FROM THE CITATION

THIS CITATION is richly merited — for here is a branch of industry that has done a remarkable war job that has not been generally recognized.

If electric power should fail, or if it be too little or too late, the disastrous effects would startle all America. Vital machines would be motionless. Millions of homes would be cold—and an eerie blackout would descend over the land.

But, electricity has not failed. Rather, in 1943 twice as much power was produced as in the year before the war—with the minimum of new facilities—and despite large losses of skilled employees to the Armed Services.

In the words of J. A. Krug, Director, Office of War Utilities of W.P.B., "Power men—public and private—should be proud of the job that has been done in providing power supply. Power has never been too little or too late."

We of General Electric, who have built a large part of the electric equipment which generates, distributes, and uses the electric power of America, take pride in the way this equipment is standing up under the strain of "forced draft" wartime operation.

Many of the men and women responsible for this remarkable record are your neighbors—the manager or meter reader who lives across the street, the girl in the accounting department who is in your bridge club, the lineman with whom you bowled last night. A word of appreciation from you to them will lend added significance to this well deserved citation. *General Electric Company, Schenectady, New York.*

GENERAL ELECTRIC

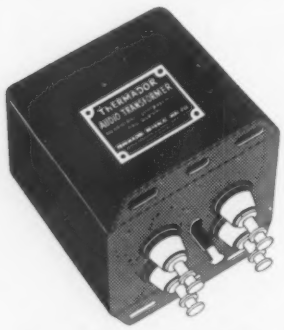
952-608-211

DEFEATS

HEAT

COLD

HUMIDITY



THERMATITE TREATED

THERMADOR TRANSFORMERS

Thermador Transformers are Thermatite treated to withstand extreme temperatures and humidity—arid or moist heat—dry or damp cold do not hamper their efficiency. Thermatite is the name of a process of accurate heat controlled vacuum impregnation developed and improved over a period of ten years.

Thermador also manufactures built-in Electric Heaters, Electric Ranges, Electric Water Heaters.

THERMADOR
Electrical Manufacturing Co.
5119 S. Riverside, Los Angeles
"Seven Leagues Ahead"

BULLETINS

data books, etc.

Insulators (429)

Porcelain Insulator Corp. has issued a new and completely revised catalogue of Pinco insulators, showing units which can be supplied under Schedule 5; WPB limitation order L-154. The 12-page booklet contains, in addition to specifications, tables of suspension string data, stacking unit data for switch and bus units and bare wire tables for use in reference to all classifications of Pinco clamps. On the cover is an illustration showing some of the replacement insulators, different from standard American types, used in shore installations by invasion troops.

Story of Dry Batteries (430)

National Carbon Co. has published a 47-page booklet, "The Inside Story of Dry Batteries." Published as a guide to students, the booklet starts with the fundamental principles of electricity applied to dry batteries and progresses to their characteristics, operation and construction.

Synchronous Motors (431)

Electric Machinery Mfg. Co. is offering a four-page pamphlet on its large synchronous motors. These motors begin with minimum ratings of approximately 300 hp. and are of the coupled, pedestal-bearing type. Synchronous motor control is discussed.

Phano-Charger (432)

General Electric's Phano-Charger, an adjustable self-regulating electronic battery charger for maintaining storage batteries by the floating method of charge, is described in a four-page pamphlet released recently.

Abrasion Tester (433)

General Electric had prepared a data sheet on testing toughness of magnet wire insulation with its repeated-scrape abrasion tester. The sheet tells application, features, and operation; gives description and specifications.

Carbon Seal Rings (434)

Pure Carbon Co. has issued a booklet on carbon seal rings and their application to the bellows type shaft seals.

Wartime Engineering (435)

Westinghouse Electric & Mfg. Co. has published a new issue of "Wartime Engineering," annual publication of the company's technical contributions to the war effort.

Plastics (436)

DuPont is distributing a booklet on its plastics, giving characteristics, properties and applications of "Lucite," "Plastacele," "Pyralin," Nylon, "Butacite."

Ball Bearing Maintenance (437)

"Service Procedure for Ball Bearings" is the title of a booklet prepared by New Departure Division, General Motors Corp. The booklet lists and illustrates steps from dismounting, cleaning and judging condition, to remounting.

Water Systems (438)

F. E. Myers & Brothers Co. is supplying dealers with a new consumer booklet showing its line of pumps and water systems for farm and home.

Steel Booklet (439)

American Iron and Steel Institute has published a booklet entitled "Weapons That Win" and describing the industry's role in wartime. The 20-page brochure is illustrated by graphs and photographs.

Catalogue (440)

Trumbull Electric Mfg. Co. has published a new general catalogue, giving additions, subtractions and other changes.

Extinguisher Recharging (441)

A pocket-sized booklet of recharging instructions for carbon dioxide extinguishers has been prepared by the C-O-Two Fire Equipment Co.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

400	401	402	403	404	405	406	407	408	409	410	411
412	413	414	415	416	417	418	419	420	421	422	423
424	425	426	427	428	429	430	431	432	433	434	435
436	437	438	439	440	441						

Name ..... Company* ..... Title* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

EXTRA DIVIDEND ON A SOUND DECISION

"WE DIDN'T EXPECT A WAR
WHEN WE STANDARDIZED
ON COPPERWELD GUY STRAND"

In normal times, the "regular dividend" on Copperweld guy strand is non-rusting long life. In these wartimes, Copperweld pays an "extra dividend," saving manpower and materials, by eliminating costly replacements of rusted guys.

The strong steel core of Copperweld strand is protected from rust by the thick exterior of copper inseparably molten-welded to the steel. You "guy for the life of the line" with Copperweld's copper-protected strength.

Plan to get the performance qualities that *only* Copperweld can give you. Our representatives throughout the country are at your service. Call upon them for further assistance and information.

Copperweld Steel Company · GLASSPORT, PA.

"GUY FOR THE LIFE OF THE LINE"

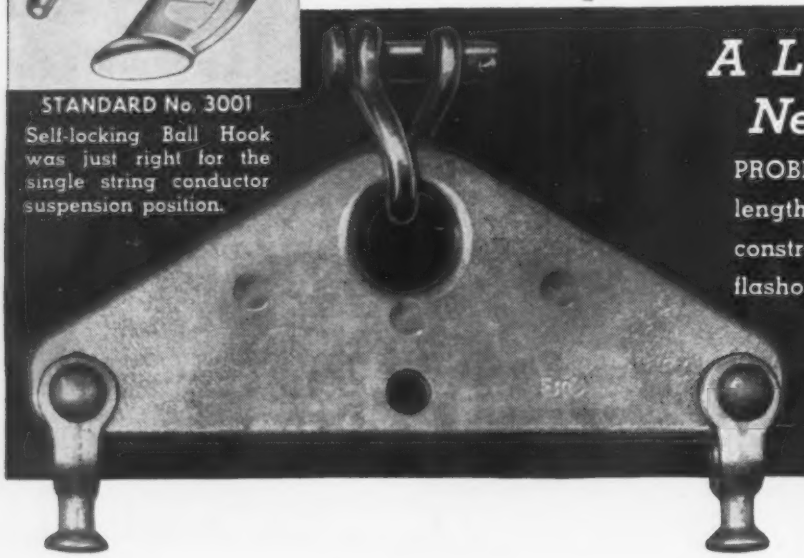
Pacific Coast Representative: C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

STANDARD No. 3001
Self-locking Ball Hook was just right for the single string conductor suspension position.

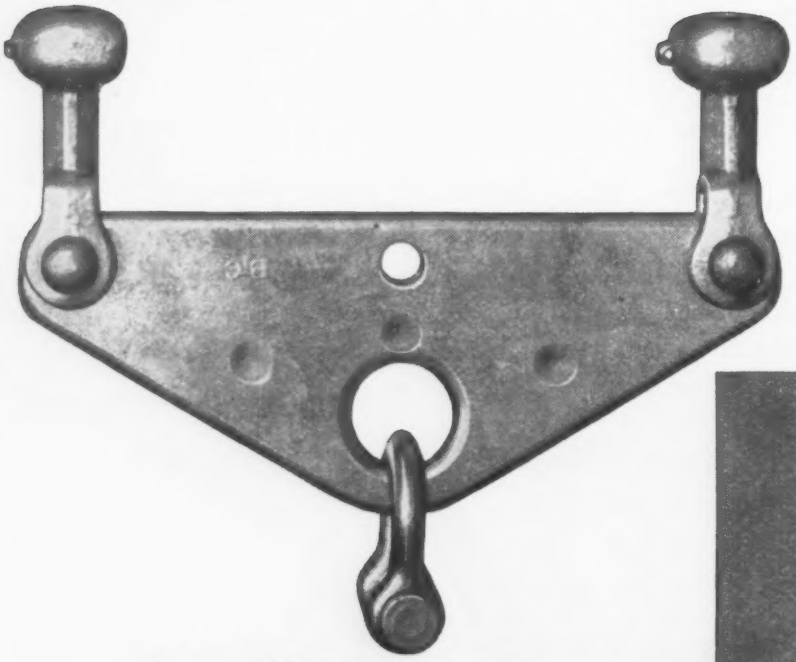
ANOTHER *Transmission*

A Large South American Needed Fittings to Meet

PROBLEM. Limited tower-to-conductor string length, unusually short in the case of two string construction, without reducing normal insulator flashover value or sacrificing desirable flexibility. Ease of assembly to tower and to clamp for Hollow Copper Conductor. Adequate strength. Use of available standard parts.

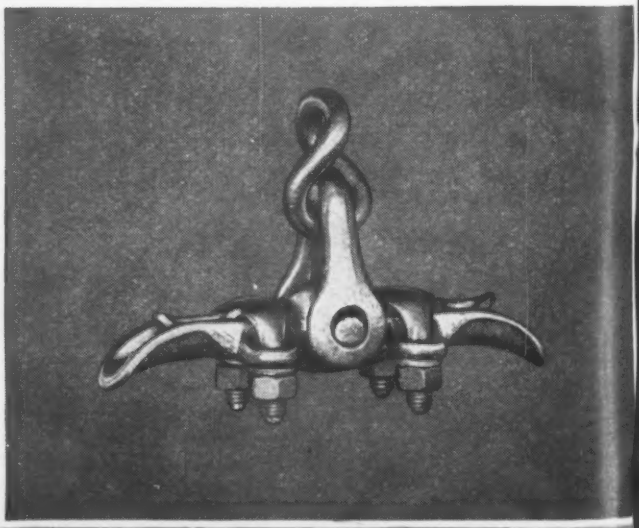


SOLUTION. Two String Conductor Suspension Assembly. Note use of standard twisted and straight shackles at top and bottom assembled through large holes in standard drop-forged yoke plate to obtain short coupling length without sacrificing flexibility thus making possible the use of the lower plate of socket clevises of sufficient length to maintain the normal insulator flash-over value.



Ground Wire Suspension

Standard No. 8200 Trunnion Type Ground Wire Clamp with No. 3080T. Twisted Link provided an assembly with adequate length of cable supporting area and with all-direction flexibility.



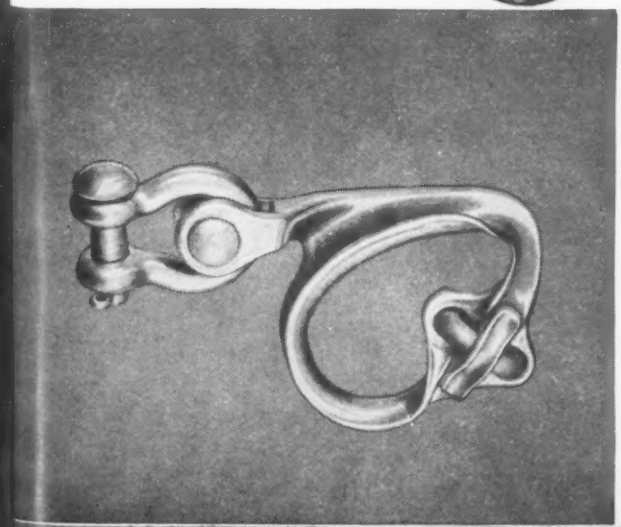
HI-TENSION SUSPENSION

THE BREWER-TITCHENER CORPORATION

Problem Solved . . .

Transmission Project Specific Requirements

This two-string conductor Dead End Assembly consists of standard BTC die-forged yoke plates for full radius round edges and corners, superior strength, finish and corona performance—proper fittings to maintain the normal insulator flash-over—terminal fittings to satisfactorily assemble to tower plate and to Cable Manufacturer's Strain Clamp.



Ground Wire Strain Clamp

The No. 2104 Clamp, close-coupled, light in weight, and with low moment of inertia combined with No. 3022 Shackle Clevis for flexible attachment to tower plate, proved an ideal method of dead-ending Ground Wire.

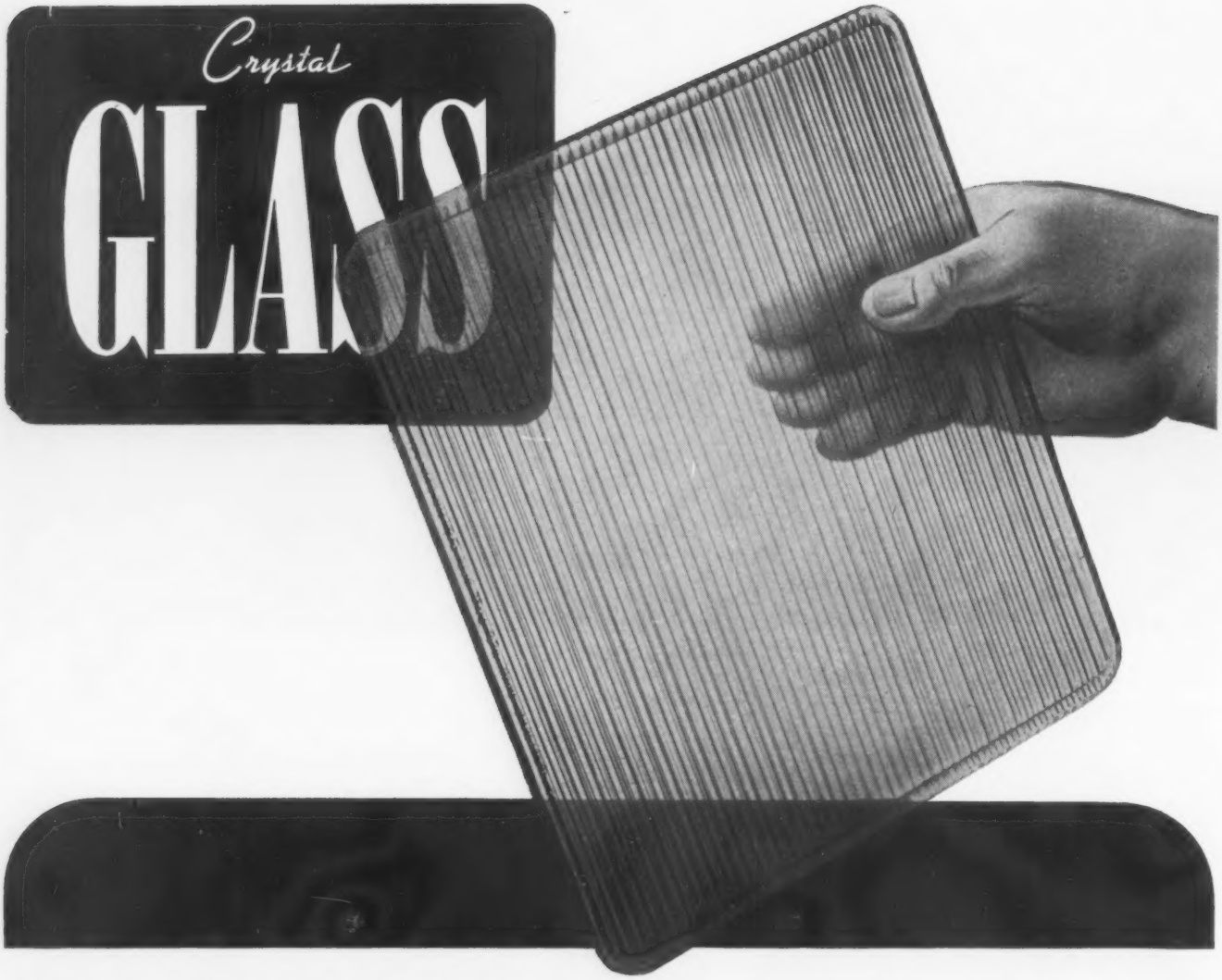
Through Your Insulator Manufacturer Only

AWARDED TO
CORTLAND FORGING DIVISION

BTC

LINE HARDWARE

CORTLAND, NEW YORK

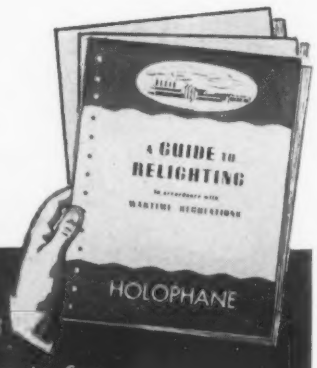


The best available material for scientifically - correct illumination Because it has all the qualities specified by the Electrical Engineer:—

- **IT IS CRYSTAL-CLEAR** (will not discolor)
- **IT IS WATER-REPELLENT** (and stays that way)
- **IT IS SCRATCH-RESISTANT** (impervious to abrasion)
- **IT WILL NOT WARP**—even at high temperatures

CONSULT HOLOPHANE ENGINEERS for authoritative recommendations as to safe, efficient permanent lighting. Specifications based on individual manufacturing conditions are available without charge. These services are offered not in competition with those of architects or engineers, but only to supplement their advice.

Write for "Guide to Relighting" and timely bulletins which present comprehensive data on every phase of industrial lighting. Available without charge.



HOLOPHANE COMPANY, INC.. *Lighting Authorities—Since 1898*

342 MADISON AVENUE, NEW YORK • Holophane Co., Ltd., 385 Yonge St., Toronto, Can.

Pacific Coast Representatives:—R. G. Dummel, San Francisco; F. van Gilluwe, Los Angeles
Distributors, General Electric Supply Corp.

LINE CONVERSION WITH LAPP LINE POSTS

is the fastest way to fortify your system.... and uses least materials

New or increased load demands frequently can most efficiently be handled by conversion of existing lines to higher voltage. For this job, Lapp Line Posts are particularly suited. Using present sound poles and conductors, conversion to higher voltages can be accomplished with no more than new cross-arms and Lapp Line Posts. Nor need such construction be considered as an emergency temporary expedient. Such a line approaches the current ideal for a new line; and your Lapp Posts can be expected to give trouble-free service for a longer period of years than you ever got from conventional insulators.

LAPP LINE POST and STATION POSTS on your system offer . .

POWER ARCOVER. *Flashover and leakage distances are not appreciably lowered by damage —even loss of several petticoats.*

NO PUNCTURE. *Puncture path in Lapp Post design is as great as flashover path. Insulator will flash over rather than puncture.*

NO CRACKING. *One piece post body, not subject to bursting from tension strains created by thermal changes in nested parts.*

RADIO INTERFERENCE. *By virtue of design factors alone, radio interference is permanently prevented at rated neutral voltage.*

NO CLEANING. *Fog-type design preserves uniform leakage path, prevents leakage flashover, makes the unit "self-cleaning."*

MECHANICAL RUGGEDNESS. *Stones or bullets deflect off, or rupture petticoats, leaving post body intact and insulator secure.*

Lapp

ARMY (E) NAVY

LAPP INSULATOR COMPANY, INC., LE ROY, N. Y.

ILLINOIS PORCELAIN WIREHOLDER INSULATORS • • • *insure safe house service connections*

• Made in sufficient styles and sizes to meet all requirements, these dry process wireholders have rounded corners to prevent injury to the wire insulation. The screws with deep, sharp threads for easy installation, are fastened into the insulators with non-shrinking metal alloy. No rust streaks on the sides of buildings will occur. Wet process porcelain supplied on special order. Write for samples and prices.

•

ILLINOIS ELECTRIC PORCELAIN COMPANY

Macomb, Illinois

These BULLETINS

COVER CIRCUIT BREAKER APPLICATIONS OF EVERY TYPE AND SIZE....

WHICH OF THESE BULLETINS DO YOU NEED FOR YOUR FILES?

#3200 **Industrial Multi-breakers.** 15 to 100 amperes, 230 volts A.C., 2 and 3 Poles.

#3500 **Industrial and General Purpose Circuit Breakers.** 10 to 600 amperes, 115 to 600 volts A.C., 125 to 250 volts D.C., 1, 2 and 3 Poles.

#4000 **Multi-breaker Load Centers.** 1 to 16 circuits, 15 to 50 amperes, 115-230 volts A.C., 1 and 2 Poles.

#4500 **Multi-Breaker Lighting Panelboards.** 15 to 50 amperes Branches, 115-230 volts A.C. Mains, 1 and 2 Poles.

#5000 **Circuit Breaker Lighting Panelboards.** 10 to 50 amperes Branches, 125-250 volts A.C. or D.C. Mains, 1 and 2 Poles.

#5200 **Multi-breaker Type MH Distribution Panelboards.** 15 to 100 amperes Branches, 230 volts A.C. Mains, 1, 2 and 3 Poles.

#5300 **Square D Type ABH Circuit Breaker Distribution Panelboards.** 10 to 50 amperes Branches, 230 volts A.C., 125 D.C. Mains, 2 or 3 Poles.

#5500 **Square D Form W—Circuit Breaker Convertible Distribution Panelboards.** 15 to 600 amperes Branches, 600 volts A.C., 250 volts D.C. Mains, 1, 2 or 3 Poles.

#3000 **Square D Switchboards.** 575 volts A.C. or D.C.

A Square D Field Engineer

Can help you solve any Electrical Control or Distribution Problem...

You're welcome to the counsel of a Square D Field Engineer. He is in constant contact with plants of every kind and size. He studies methods and applications with the idea of simplifying new jobs and doing old ones better.

Write today for Free Bulletins and full information!

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

SQUARE D COMPANY

LOS ANGELES 21 • SAN FRANCISCO 3 • SEATTLE 1 • DENVER 4
DETROIT 11 • MILWAUKEE 2

ELECTRA'S HUSBAND

How They Make It

ELECTRA's nephew (age three and a half) is just at the question-asking stage. Whenever he visits The City, yours truly draws the after dinner assignment of walking him into semi-consciousness so he'll go to bed without raising too much hell. Favorite walk is along a certain section of the water front, to reach which we must pass one of the several steam-electric generating stations serving The City. The imposing structure invariably elicits the same question:

"Whuzzat?" from the nephew.

"Oh that's where they make electricity," I always answer.

"Whuzzat?" the nephew repeats.

"The stuff which makes the lights light," I reply.

"Why?" and we are off on a seemingly interminable string of "how's" and "why's."

One night when Electra was along she joined the discussion.

"Why don't you tell him how they make electricity, or don't *you* know?" she queried.

"It's too complicated even for you to understand," I countered.

"Oh yea," she said with that knowing look.

So the following simplified discussion of the subject was finally discovered and is here presented for those other experts like yours truly who have questioning youngsters (or wives). It comes from the pen of a fireman in Pacific Gas and Electric's Station "Q.":

WHAT is steam? It is the white stuff that is forever erupting from the sides of locomotives and scaring the commuters half to death. Scientifically, it is water heated to such a point that it can't stand it any longer and goes pftt-tt-tt. To heat the water you need a boiler. This is a glorified brick oven with about 40 miles of metallic intestines prettily inlaid with fire brick. These tubes connect to a drum above and to another drum below and at the back called the mud drum. This upper drum roughly corresponds to the human stomach and the lower drum to the kidneys. On the lower drum is a fixture called the blow-down valve. (Maybe we had better abandon this human analogy; it's getting too complicated.) There is a valve above, too, called a safety, but we ignore that and just hope it works.

Under this thing is built a fire. For this you need firemen. *(Right here I'll have to tell the nephew that these firemen don't ride on red wagons.)* The fuel may be gas from the central office or oil. If oil, it is shot underneath the tubes with an atomizer just like milady uses to spray her tonsils. Of course all of this is being simplified for purposes of clarity. The assistant superintendent and the engineers assist the firemen in their work by jumping up and down, emitting war whoops and turning off valves and faucets as fast as they are turned on.

Also seated upon a cloud high above Knob Hill is the Great White Father. With spy glass in hand, he scans the horizon for smoke from company stacks (good little firemen mustn't make smoke). If any is seen he forthwith issues a special order-of-the-day, making it *malum in se* and *contra benes mores*. This means we are all dead ducks.

After the fire burns awhile, the water starts to steam. The steam is carried up through superheater tubes to the steam dryer. By this time it is really fuming, and is ready to be turned loose inside a turbine. This makes the turbine turn over—and wouldn't you? The turbine is attached to another mechanical monster called a generator. As it turns over, it makes that funny stuff which causes light bulbs to glow and ladies to jump at American Legion parades.

To return to the turbine, the steam goes in here and it comes out there. What to do with it? Obviously with the war, we can't waste it, so we pop it into a condenser. There it is cooled by a mixture of salt water, kelp and fish and becomes water again. It is then used over and over until it is worn out. The guardians of the condenser are called condensermen, a nocturnal species seldom seen in sunlight. When seen at night they look like chimney sweeps and are usually found coiled around pipes or wedged into ducts or manholes.

There is also an oiler. His duty is to oil all stairways, handrails and tool handles; also to see that all rags and waste in the station are properly soaked in oil. In off moments he prowls around looking for squeaks and rattles.

There is still another character flitting around called The Superintendent. What his duties are I've never found out. This one wears a flower in his buttonhole and swears like a Barbary pirate. He is always being asked for on the telephone, but takes off like a P-38 before you can tell him about it.

NOW if Electra and the nephew don't know how a steam-electric plant runs, they'll have to wait until peace. Maybe then they won't care.

EXECUTIVES are notoriously poor public speakers. It almost seems the bigger the shot the poorer the speech, with a few rare exceptions. Even when the publicity man or the public relations department writes the address, the poor executive sometimes has a hard time reading "his own handwriting," when it comes to delivering it.

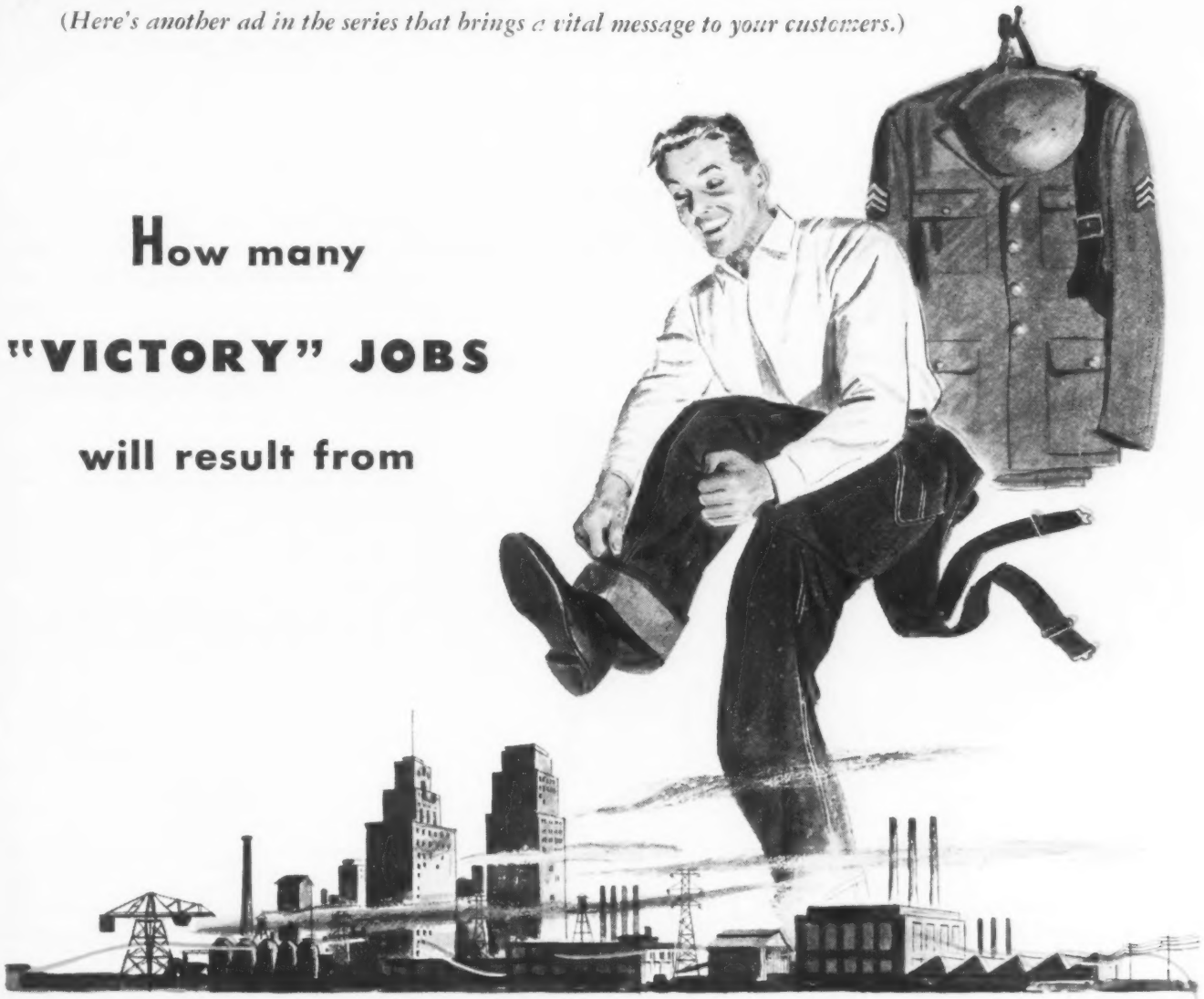
But electricity can come to the rescue of the handicapped executive if he will only let it. (And what a market for postwar sales this ought to make!) Electricity can give the business man a voice at last, and certainly he may need it in the days following the war.

Over the radio who has not heard the locomotive shriek "Fight headaches three ways!", followed by chugging suggestion as to what to do about it. And who has not heard the fog-horned "B.O." This is all done by the telephone company with its device to bring into the throat of the speaker the sounds of the locomotive from a recording. It is said that movie stars with no voices at all, and one suspects that this must include all of them, can be made to simulate singing with the borrowed voice of Caruso or Lily Pons. Even Frank Sinatra might be made to sing on key by means of it.

Why not, then, let the publicity man or the public relations man with the golden voice, make a record of the executive's speech. Then as the head of the company arises to the flowery introduction, the publicity man behind the screen could switch on the record. The speaker at the throat of the executive would sound out the words through the man's own larynx and mouth cavity. All the executive would need to do would be to open his mouth slightly, move his lips a little, and he would thus spellbind his audience, all of whom would be surprised to find him so eloquent.

(Here's another ad in the series that brings a vital message to your customers.)

How many "VICTORY" JOBS will result from



increased use of *Electric Energy*

It's an exciting postwar picture any way you figure it. Expanded use of electricity is one of the brightest fields to count on for jobs for our returning service men.

Think of the employment that will result from electronics alone, which includes radio, television and countless industrial and home applications. Or consider air conditioning, heating, cooking, lighting, refrigeration. As new and finer electrical products are developed, employment all along the line will be created . . . within the electrical industry, and in every other industry.

But one thing is self-evident. Wiring will have to come first. Adequate wiring will be essential to full utilization of the electrical possibilities of the future. Now—in advance—is the time to plan for it. By all means, give it full weight in your postwar thinking.

Unwired planning will cost you a whole lot more than *planned wiring!* 44223

AW ADEQUATE WIRING KEY TO VICTORY JOBS SERVES AND SAVES

HELP BRING VICTORY SOONER . . . BUY MORE WAR BONDS.

ANACONDA

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices in Principal Cities

Electrical Wires and Cables of Copper are the Life Lines of our Nation

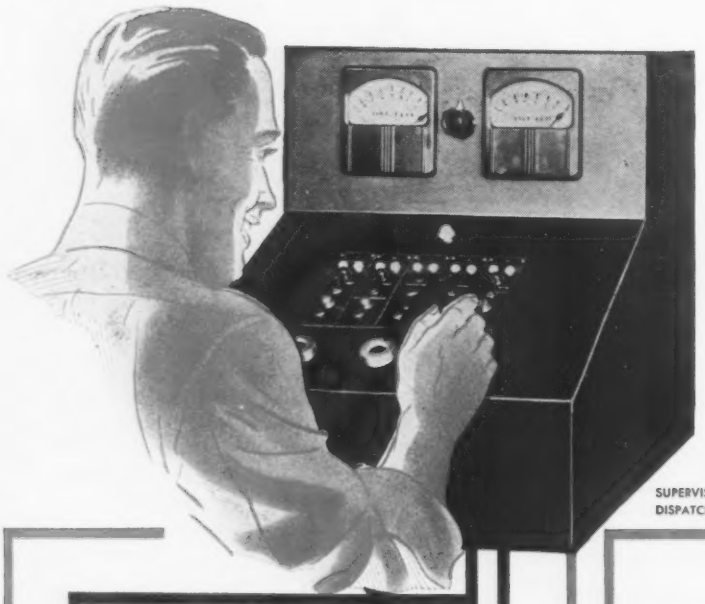
FOR ACCURATE REMOTE CONTROL AND SUPERVISION

...investigate the advantages of Carrier Supervisory Control

Time is vital when faults occur on power lines serving essential industries. Service must be restored with the greatest possible speed. This may require switching of apparatus in remotely located generating, transformation or conversion stations.

Supervisory control, using carrier channels, has proved the most efficient means of performing this function over long distances. It provides the highest degree of speed and reliability.

Westinghouse engineers have gained wide experience in applying supervisory control to meet special needs. This service is as near as your Westinghouse office. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. J-95088

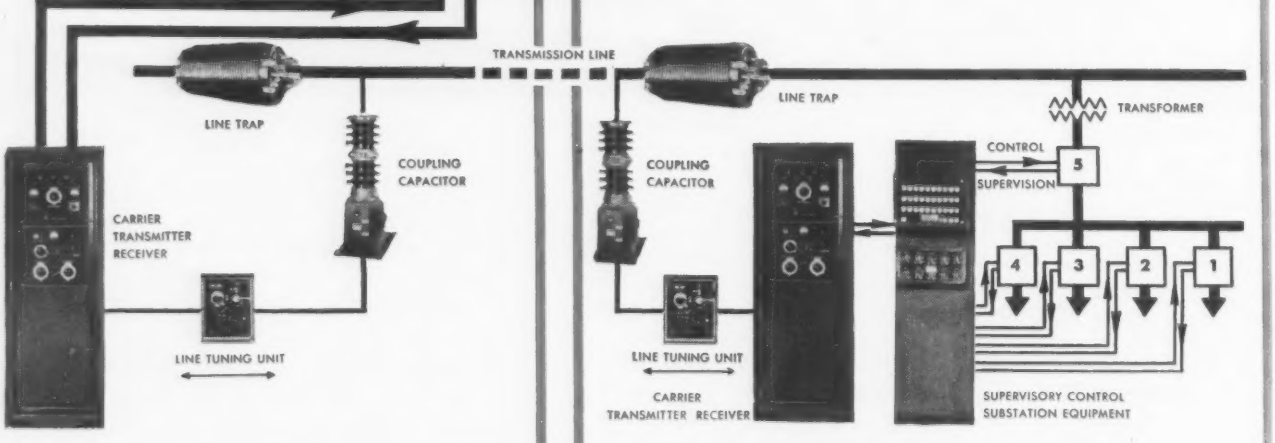


SUPERVISORY CONTROL DISPATCHER'S EQUIPMENT

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Electronics at Work



BASIC ELEMENTS OF CARRIER SUPERVISORY CONTROL

AT THE DISPATCHING END:

Dispatchers Equipment: An assembly of control switches and indicating lights for devices to be controlled . . . and coding relays that key the carrier transmitter or respond to a received code for selecting points for control. Also for performing close trip or supervision functions.

Carrier Current Transmitter-Receiver . . . generates and receives carrier when actuated by the supervisory equipment.

Line Tuning Unit which cancels the impedance of the coupling capacitor.

Coupling Capacitor—through which carrier current flows into or out of the line.

AT THE SUBSTATION END:

Coupling Capacitor—through which carrier current flows into or out of line.

Line Tuning Unit which cancels the impedance of the coupling capacitor.

Carrier Current Transmitter-Receiver—generates and receives carrier when actuated by the supervisory equipment.

Supervisory Control Substation Equipment—responds to the received code to select the device to be controlled, and perform the proper control action.

ELECTRICAL WEST

APRIL, 1944
VOL. 92 NO. 4

Let's Not Drag In On the Late Train

Postwar planning may seem premature, but any good farmer knows that to have a crop in the fall, cultivating and planting should be done

Kimball Jack
The Washington Water Power Co.

THROUGH Indian Summer weather the farmer plows and harrows his land, ready for planting. When spring rains come and sunlight warms the brown earth, the farmer is prepared to cultivate his crops and eventually harvest them. He knows precisely how many acres he will cultivate, and whether his granaries and barn will be filled with wheat, peas or razorbacks.

To postwar planners, the farmer sets good example. Not only does he dream and discourse; he also piddles a little and gets something done.

Planners for the electric industry should well know that come tomorrow, when clouds of war and the blight of curtailments have passed, the world will need sowing, cultivating and grapefruit, not to mention baby buggies. Right now the electric field should be disked and made ready; right now the hired man should halt erosion and incidentally set a few mouse traps by the granary door.

Let us traverse last year's stubble and briefly analyze some of the components that have to do with industry's postwar needs. We have no idea that this will be a scoop. All of us are in the same bouillon. Casual thoughts that are expressed aloud have only one purpose—a hope that the electric industry will not drag in on the late train.

First we may ask, what major problems face any electric company? To what degree should poachers, boundary lines and marketing be emphasized? Though true blue Bourbon Democrats risk blame for the next depression—which may never come—all of us agree that our most urgent national postwar problem is unemployment. The electric eye has counted a potential 11,000,000 men who will need jobs when the war ends and every company is urged to employ 40% more men than were on the pay roll in 1940.

This is no idle speculation. The last depression saw 14 million unemployed and the impact of another such catastrophe could wreck constitutional government as established for nearly 150 years. Thousands of young men in the service, called upon to die to preserve American institutions, look askance because these same institutions appear in the measure of jobs unappreciative of the sacrifice.

To hire 40% more men than the 1940 employment level calls for large and immediate expenditures when the war ends. It means that engineering studies and make-work committees today must delve into maintenance and repairs; remodel offices, warehouses; contribute to civic improvements—auditoriums, playgrounds, highway beautification—matters financed heretofore from government's purse, much to the debtor's subsequent embarrassment; build model all-electric homes, representative of the future; model experiment electrified farms; city assembly centers for rural and farm shoppers where they may rest, phone and review electrical gadgets; a clearing-house for employment in the electrical industry; extensions to new customers; improvements in service; summer camps for employees; numerous projects that build the purchasing power of consumers—dairy projects, manufacturing of farm by-products; nor do we need to swallow a dromedary to embrace more humanitarian efforts such as hobby centers supervised by our aged to prevent juvenile delinquency; the maintenance of a competent personnel department to which underprivileged may come for vocational guidance. These are no catch-penny schemes. If business does not do them, government will for the simple reason that the masses demand them. The moment such projects are adopted, the utility should tell the world and thus gladden troubled hearts.

But temporary jobs are not enough. Like all good liquor, they only elevate a man high enough to let him down hard. Employment is synonymous with eating. It goes on and on. Perhaps industry should breathe deeply and expand itself. Perhaps now is the time to decide if it is feasible to purchase the adjoining 40 acres—no one mentioned the REA. The crux upon which rests all long-range planning is growth. Can an establishment develop further, or has it reached maturity and old age?

Evolution in a world of energy will not permit the electric industry to stand still. Either it must assume that it is a growing enterprise, or it automatically falls into one of several stages of decay.

Too many customers, and also employees, have the vague feeling that the electric company has ceased to grow; that its street is a dead end; that men at the helm have shut off the power and are floating downstream; that Edison's pride and joy is a mere hulk, a carcass of the once active man. Management's responsibility it seems, therefore, and certainly something to include in postwar plans, is a courageous decision regarding future possibilities. Do we accept expansion or shrinkage; must we prune and plow under and allow the little homestead to deteriorate, knowing full well that some other squatter, such as an energetic public-ownership group, will discover and wildly proclaim the electrical industry's unlimited possibilities?

Decision regarding this two-way path is not easy. Management must consider potential power supply; know if and where he can obtain reasonably priced produce, and in what amounts. Someday a scathing pasquinade will be written about our growing dependence upon government sources of power, which may be barely available to private industry.

To this question of expansion, management is also required to hazard a

guess regarding labor costs, dividend and interest requirements, rate reductions which, on the Pacific Coast, are chaffed by political hands into public consciousness; taxes, which seldom lessen. Indeed, in the matter of taxes, there grows the opinion that peace must be as costly as war; that if the people will spend X-dollars to enforce with guns a peaceful settlement, that same peace can be obtained without the use of guns only by the expenditure of the same number of dollars. That means only one thing—more taxes.

Management, too, in looking to the future, must consider the effects of government tolerance. Guiding lights of industry may be so engrossed in defensive fighting for existence, that encroaching cooperatives which have succeeded in establishing themselves in every part of the globe except the U. S. A., may force unusual and costly services to win consumer alliance; that government restrictions pertaining to finances, monopoly, labor and rate yardsticks, may prevent the plow horse from rising with its load.

It is this matter which looms as the industry's major postwar problem. Like a plague of locusts, hurried social change, aggravated by every radical who could shove his bunions into a number 14 shoe, filters into all activity and tends to destroy the crop even before it ripens. It is the political field —encroachment of government—customer attitude permitting encroachment—that holds the greatest threat to industry, and consequently makes the greatest opportunity for a safe future.

Truly the electric industry has an overwhelming public relations need. Recent public opinion surveys bear this out. Glance at local election results. Yet industry goes at the job like a man on stilts. It seems irreconcilable with logic that with no major engineering projects in sight, no new accounting or operating procedure to formulate, the electric industry maintains (properly enough) strong representation from established departments in its administrative head, yet too often allows public relation safeguards to pass like driftwood with neither organized plan nor designated responsibility.

Wishful thinking it is to assume that on Victory day, when war-weariness forces the present administration to relinquish control, that difficulties of the electric industry will end. Be it known that the politician is guided by public opinion. Our bureaus employ not one but several research agencies to verify public trends. Ailments, though stirred by political promotions, are not entirely rooted there. The year 1922 saw the greatest number of municipal electric systems in the history of the nation, and that was not a "New Deal" year. Kilowatt-hour production of public plants has steadily increased, and geographic expansion amazes even the promoters. The absence of municipal elections today does not necessarily mean that the consumer has lost interest in public ownership; rather it means that proponents are using different tactics than through the electorate. It means that public attitude, slumbering in the lavish arms of war expenditures, or grumbling at government inefficiency, may flare anew at the opportune time.

What is it that people do not like about private utility operation, and what should any firm do to regain favor as a public servant? Partial answers to the question come to us through public opinion surveys. No complete study of the field has ever been attempted. Too frequently the electric industry has gone to the consumer with hand-picked questions which limit response to a few details acceptable to management's views. Basic human drives are overlooked and, substituting for broad information which would give insight into human behavior, we collect evidence to support a theory. We plow and plant as our grandfathers did and the result is not flattering.

Postwar planning cannot overlook the tremendous influence exerted upon the populace by leaders of political coups, professional and misled agitators, some of which were and still are Fascist and Nazi sympathizers, while others work relentlessly for their own brand of socialist state. Under the guise of patriotism and humanism, they seek to array the masses against existing order. It is well known to these lusty agitators that not more than 7% of the American people ever voted for socialism when labeled as such, and not being required to submit themselves to "grade labeling", the agitators now mingle in halls of virtue. Why is it tolerated that a director of the national socialist party, candidate for office in the socialist party, and an untiring worker for socialism, be allowed to hide his identity under a pseudo cause, "Christian Front", or a farm movement and spread propaganda to the people he pretends to benefit? Any man recognizes the right to speak up. But on the other hand, no man admires misrepresentation or subterfuge. Someday, someone will force the demagogues to fly their true colors. Now is an excellent time to start.

Public opinion surveys show that only about 12% of the people in various sections are critical of rates to a degree that they would trade excellent service for small rate gain. Up to 79% think rates satisfactory, indicating that industry can place overemphasis upon the rate question, and suggesting that other factors crystalize attitude. Census reports, on one hand, show that about 73% of farm population in specified Pacific Coast area is electrified—an excellent achievement. Still the state of Washington, which is one of the most highly electrified, has some 16,000 farms without electric service, and one is led to wonder what multiple of voters are turning to government for the answer to their economic need.

In June 1943, a national survey indicated that only 25% of the voters would rely upon private industry for personal security, and 56% would turn to government. Security was, and now is, America's greatest concern. Fortunately, since that time American business has made important strides to create employment, while government has done little to establish a similar reputation for productive efficiency. A sizable group—thanks to Uncles Spite and Hate—believes that the electric company makes too much profit, hinting that there is little wisdom in megaphoning statistics larger than three digits. A small percentage of voters received discourteous treatment at the hands of employees and a more sizable group state that they never experienced warmth or friendliness from the cold corporation that serves them with electricity.

Postwar plans will not be complete unless management and employees look realistically at consumer attitudes, learn more about the human element and give not so much ballyhoo to quotas and the delegate from Victoria. Customer relations are a vital necessity; they demand executive emphasis and require that every policy, program and procedure be examined in the light of effects upon public opinion.

Assuming that make-work projects will be underway as our first consideration, and that customer problems will have due attention, the firm may next give thought to the long-range program of providing satisfactory service to more and more people. At least that's what we think should come next. We are not sure, for here we must admit that we know absolutely nothing, and that not well.

Selling, however, seems to be the hub of expansion and a good weight that intensifies service. One need ask what ultimate saturation in the use of electricity can be expected. Already on the Pacific Coast the average residential consumption has reached 2,679 kwh., with saturation of appliances going 76% to refrigerators, 40% to electric ranges and 30% to electric water heaters. With this accomplishment, should a utility return to merchandising, build up stocks, promotional costs, and generate competition with small dealers, or will the utility rely upon

dealer effort? In a recent manufacturer's survey of the field, 63% of utilities said "yes" they would merchandise and 31% said "no".

Large chains and national lines plan to enter the electric appliance market. Also, for a year or two after the war, there may be appliance shortages and utility participation in direct selling may detract from the survival of small dealers. Both company and dealer, however, need to know what the market offers as to type of equipment, costs and demand; what manpower will be available; and the postwar planner cannot start too soon to lay the groundwork for developing a sound all-industry organization.

Possibilities in the electrical field, the promise of a fuller, happier life for the consumer, will do much to hold him as a loyal ally to the firm that serves him today. That is industry's trump card. The crackpot, uncorking himself with oratory, cannot duplicate achievement. As the program develops, as new uses are found in our laboratories, the utility should use publicity and advertising to the fullest extent to inform the consumer as to what lies ahead. This and only this will convince the masses that the hand of management is on the plow. Industry cannot afford to be silent.

Rural areas, too, with many thousands of farms using kerosene lamps need more consideration in tomorrow's plan. And what about a new approach to municipal lighting, the object of which may well be civic pride and a happy city council? What relative emphasis can be given to commercial and low-rate industrial service in tomorrow's world?

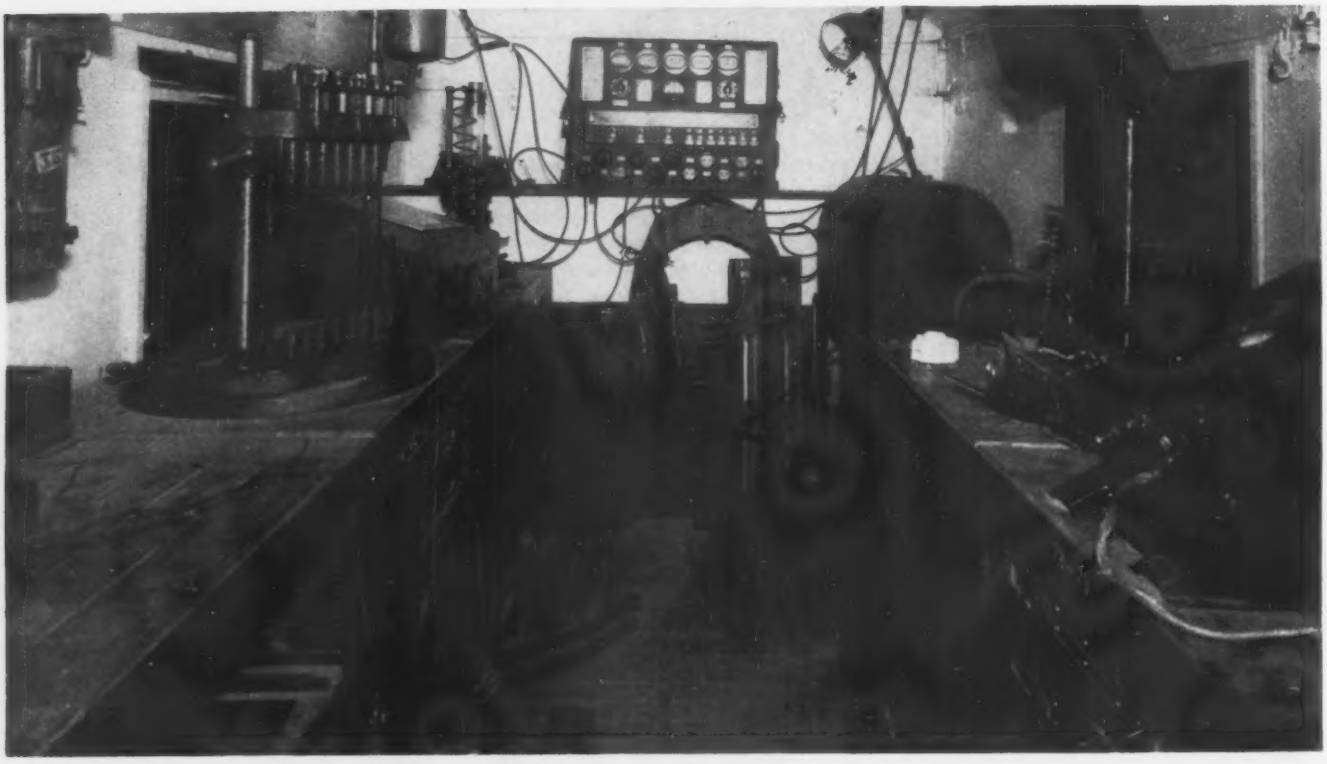
Postwar planning is not a one-man job. Around the council table all departments must sit, and though management makes final decision, coordination and insistence is more easily obtained through the appointment and recognition of a single man. It is he who will speed details and see that objectives are not lost in weedy sections that border the field. These objectives, named again in summary, may well be emphasized as follows:

1. Find ways and means to give immediate employment to your quota of 11,000,000 men when the war ends.
2. Watch every activity and revise every policy if necessary to win consumer approbation.
3. Assume that the industry is youthfully strong, and that now is the time to develop long-range opportunities for growth and improvement of service tomorrow.

But hurry, please! All road signs beckon urgently forward. We have in mind two restless groups who will attempt the job if industry fails. One group is government. The other group is womenfolk, alas! Females now working in war factories, wearing Red Cross and Lieutenant uniforms, plan with a cunning little turn of the head to take over the whole works as soon as possible. The woman will twist her rosy lips as she twists the unemployment problem, and as to board and committee meetings—all the things indulgently multiplied by the menfolk, they are strictly woman's dish. Therefore, in conclusion, may we say that every man in the industry who would escape such measures should respond that he is ready to start the onward trek, and that he, personally, will see the job finished.

CIVIC SUBSTATION

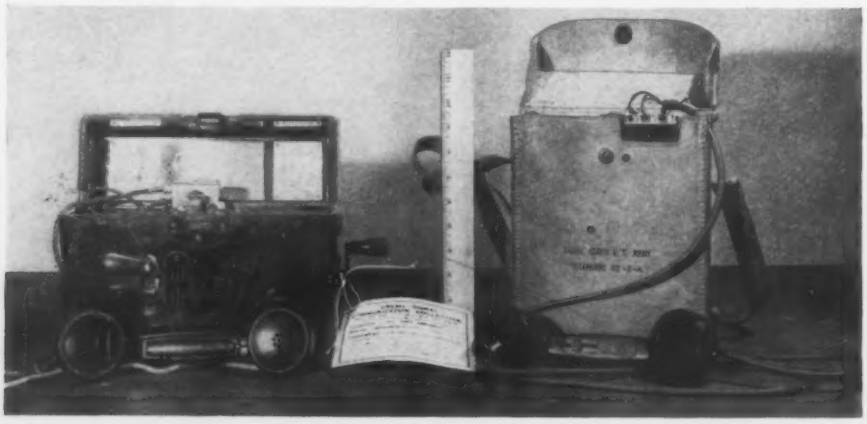
Turning a liability into a major public relations asset, Portland General Electric Co. has developed a fully equipped civic campaign headquarters on the ground floor of its home office building. These offices are lent, rent free, to the War Chest, Red Cross and other civic agencies. The space, formerly a substation, was modernized with non-critical materials, under direction of Pietro Belluschi, Portland architect. Central location in the heart of the shopping district and near large office buildings makes the quarters particularly valuable as a campaign center



Enemy's Equipment Loss Is Our Gain

Captain E. A. Whitehead
U. S. Signal Corps, Washington, D. C.

Above: German field telephone from top, showing German phmetic alphabet. Below: 1933 model, complete with Telefunken handset and ringing generator Comparison is with Signal Corps type EE-SA (right) which is interchangeable



CAPTURED enemy equipment does not go into a nice big bonfire. Souvenir hunters do not send it all home to their wives, mothers and girl friends. Most of it goes right back to work fighting the enemy.

Free French troops, outfitted with aid of Allied equipment, have taken great advantage of captured Nazi equipment of all varieties. Russian armies use every bit of German materiel which comes to hand. Chinese guerillas make periodic raids on Japanese supplies to replenish their own stores. American troops have specialists to handle repair and return of abandoned enemy equipment to fighting fronts.

No amount of crystal-gazing can give a radioman the answer to how to "zero-beat" an Italian tank transmitter or regulate a Japanese direction-finder. American Signalmen's ability to repair, operate and maintain captured

Top of page: German automotive repair shop (captured) showing location of control panel and various equipment. Opposite: Exterior of automotive repair shop, showing oil cans and compartment for spare tire; rear interior showing battery charger and spark plug checker. Note the detail

Nipponese and Nazi signal equipment is no mere accident. Behind the scenes of putting enemy production back to work against the Axis are the best minds U. S. Signal Corps Laboratories can find.

The captured equipment test sections of Signal Corps Laboratories located at Fort Monmouth, Red Bank, Eatontown and Belmar, N. J. and Wright Field, Dayton, Ohio, act as clearing-houses for analysis of enemy signal materiel. Industrial laboratories located throughout the country have assisted in analyzing enemy equipments which are directly comparable in application to the same type of Signal Corps equipment which they manufacture or design.

The resultant reports received from the various laboratories contain complete technical and tactical data. This is forwarded to the Office of the Chief Signal Officer where the Enemy Equipment Identification Service section evaluates and correlates the data received and disseminates results to all interested parties. Exchange of similar data between other branches of the service, allied and neutral countries, and key industrial engineers, provides a continual supply of technical intelligence. Out of this "melting pot" of ideas comes information for four vital uses:

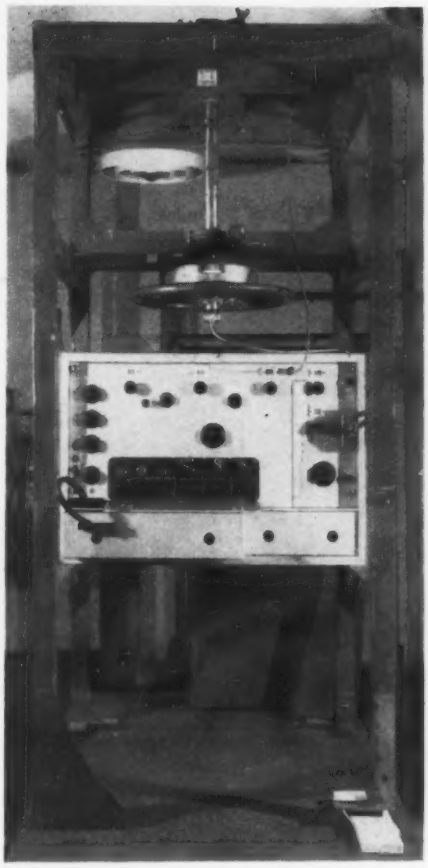
(1) Countertactics are devised to make similar equipment, still in enemy operation, less useful.

(2) American designs are improved by incorporation of any features found to have merit or new equipments are added, such as the so-called Gibson girl transmitter.

(3) American Signalmen are trained in use of such equipment so they may take over immediately on the battlefield.

(4) Intelligence officers may estimate economic conditions in enemy countries from use of "ersatz" or inferior quality materiels.

The average American soldier might show only amazement at what close copies Jap radio tubes appear to be—the trained specialist, aided by work of the laboratory technicians, will see beyond the Jap symbols and know the power and use of such tubes. The skilled Signalman will know that a Jap battery may look the same as ours but will not last as long. He will know what German and Nipponese markings mean and how to set dials from operating manuals provided.



Japanese special D F. receiver model No. 94, type 7, mounted in frame support, including azimuth handwheel and shaft connecting with loop antenna on top. Equipment of this type shows mixture of German, U.S. and British design

Italian pole climbers. Not much like the familiar American lineman's "spurs"

Specially trained teams will follow the troops into combat and apply their training to test, repair and teach operation of enemy equipment. Unusual equipment will be immediately shipped back for laboratory analysis.

It is interesting to note in captured Jap materiel at the laboratory how a mixture of German, U. S., British and other designs has been incorporated by the Nips. Tubes look like direct copies of our common receiver models, batteries carry crossed flag insignia and have red and black wires as ours do, but the Arabic numerals are arranged in accordance with a strange system.

Original design is more apparent in German model radio sets, easily identified by aluminum and magnesium-die-castings used in their production. Italian materiel, of which the captured supply is plentiful. follows the German fashion—doubtless because of use of German engineers in Italian factories. Some Japanese equipment gives the lie to any Jap claims of not planning war during the past 15 years—the design is of such nature that it took years of planning.

Japanese power supply units show enormous wear using average lubricants, and in some cases need specialized lubricants difficult to obtain. German materiel, on the other hand, shows advances in lubrication—especially in an automotive electrical shop so constructed that all component parts of the truck may be greased by pumping a lever in the truck cab.

Many of the laboratory tests are conducted in double-screened rooms, built to shut out all atmospheric interference. Away from static and noise, the engineers are able to find exactly what the abilities and limitations are in various radio transmitters and receivers.

The German automotive electrical

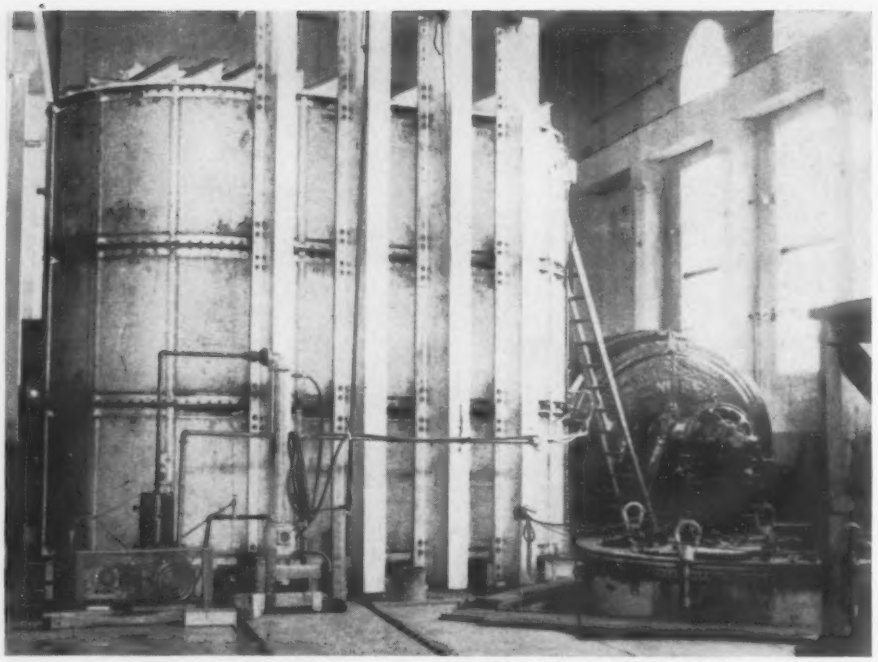
repair shop illustrated is mounted on a 4½-ton, 4 by 4 truck with 6-cylinder Diesel engine. Although it traveled only 997 kilometers before falling into Allied hands, and contains some tools never or little used, it has received some battering. Remains of denim overalls and bits of sandwiches attest to the speed with which it was abandoned—yet the Germans had time to attach a couple of booby traps, one in the engine and one in the back door. Although the truck was thoroughly inspected by ordnance men at Aberdeen, Md., some workers are still hesitant to open doors in fear of others. Although the "Füsse Anstricken", or "Wipe Your Feet", beside the back door resembles a house "Welcome" mat, the booby trap in the back door provides no such cordial reception. An attempt was made to fire the truck before capture, but it only singed part of the camouflage spray paint job.

American meters are included in the truck cab, and tools include an ingenious extension air gauge. Construction of the truck, which has a removable top for rail shipment, is of a material similar to masonite and not very durable for combat areas. No provision was made to gas-proof the truck, but every vent has blackout attachments. The headlights are unique in this respect.

In the shop are battery chargers, tools of all natures, rectifiers and equipment necessary for third echelon and heavy repairs. The Continental tires—which would make the average motorist green with envy—are marked "Made in Germany", "Deutsches Fabrikat" and "Fabrique en Allemagne", to dispel any doubts of where they came from so far as British or French are concerned. Gas tanks are arranged in tiers of seven.

Every little detail, unimportant as it may appear in itself, is thoroughly checked so that our men on every fighting front may know more of what equipment the enemy can throw against them and more about how to turn that equipment back against the Axis when it is captured. These little-known behind-the-scenes technicians are playing an important role in hastening our ultimate victory.

● *The Power Interest and the Public Interest* is a new booklet recently issued by the power committee of the 20th Century Fund. It touches upon regulations, the carrying out of the "death sentence" against holding companies and also touches on the old question of private versus public ownership, comparing the relative efficiency of both and predicting no curtailment of either of ownership. Members of the committee are executives of both public and private utilities.



This specially built vacuum tank is used by Southern California Edison Co. for dehydrating the core and coils of large substation transformers. The three-section oval tank is reinforced against collapse by four "I" beams to withstand a vacuum of 29 in. Thermostatically controlled strip heaters provide 144 kw. for drying. Five thermohms are placed around the core and connected to a telethermometer on a test panel to check for hot spots. Temperature is not allowed to exceed 200° F. About 30 gal. of water was removed from one core. Wet filter paper is reclaimed by putting it in the vacuum tank along with the transformer

Dubbed the Flying Swoose by workmen, this adaptation of old radiators to a water cooled transformer of ancient vintage is another example of the ingenuity of utility engineers in doing with what they have under war conditions. The 2,000-kva. transformer was "built wrong" for the radiators which had been purchased for another transformer and Earl Baughn of the Washington Water Power Co. conceived the idea of mounting the radiators at an angle as shown to obtain natural water circulation. This would have been unnecessary had there been water supply at transformer's new location—but no such luck. The unit is carrying load

Checking Field Winding Temperatures

A simple method of determining field winding temperatures for any machine from switchboard readings is described. Few machines are equipped with temperature indicators for rotating field windings

R. J. Cobban
The Hawaiian Electric Co.
Honolulu, T. H.

MOST large alternating-current generators and synchronous condensers have embedded temperature detectors in the stator winding for measuring winding temperature, but there are very few of such machines equipped with temperature indicators for the rotating field winding. The temperature of the field winding can be determined for any condition of loading from field current and voltage measured at the collector rings by the well-known rise by resistance method. It is usually difficult to take voltage readings at collector rings, and calculation of field temperature is neglected for many machines.

A convenient method is described for determining field winding temperature for any machine, in which switchboard reading of field current and field voltage may be used with a monograph easily plotted, for the characteristics of the field winding of each machine.

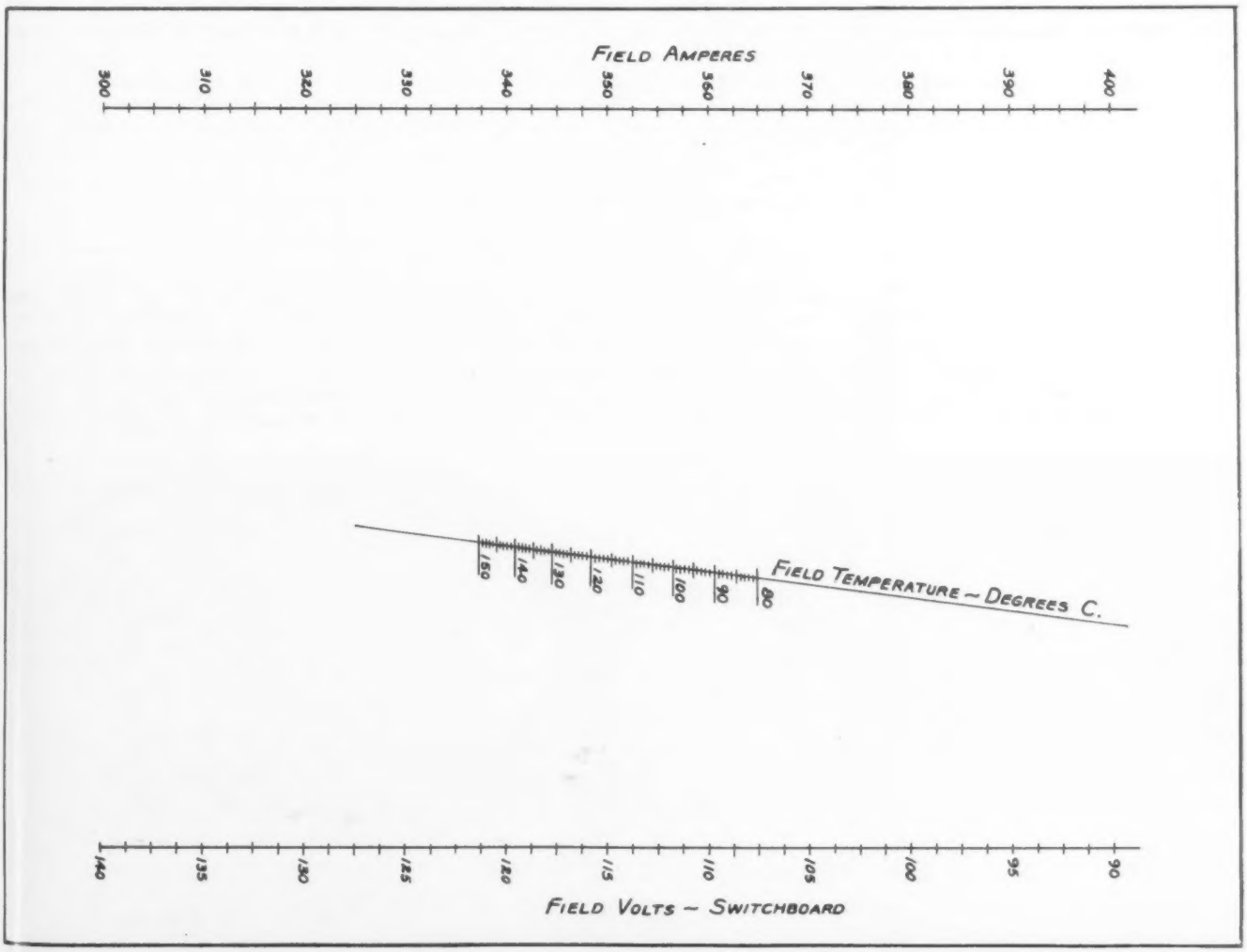
This method makes use of the well known formula:

$$\frac{\text{Resistance of winding at } T^\circ \text{ C}}{\text{Resistance of winding at } t^\circ \text{ C}} = \frac{234.4 + T}{234.4 + t}$$

With the known test resistance of the field at a given temperature, the resistance may be calculated for all temperatures through the permissible operating range for the class of insulation used on the field winding of the individual machine.

This monograph plotted from tabular data permits readily checking field winding temperature for any given switchboard reading of exciting current

A typical example will demonstrate the method. The turbine-generator used in this example has a measured field resistance of .2852 ohms at 75° C. This generator has Class B insulated field winding which is suitable for 85° C above 40° C ambient, as measured by rise by resistance method in accordance with ASA standards. Calculated resistance values given in the accompanying table, when multiplied by field current will show voltage required at collector rings at various temperatures. To the collector ring voltage must be added the voltage drop



of the field circuit between switchboard and collector rings. In this case, the voltage drop was taken at near maximum field current maintained for two hours to obtain correct compensation in the critical temperature range when using switchboard readings for temperature measurements. The error produced from using a constant voltage drop for the field circuit external to the collector rings at lower temperatures and lower field current, is not considered important. Slightly higher than true temperatures will be indicated at lower field currents.

Field Temp.	Field Resistance	Amperes	—Voltage— At Rings	At Switchboard
80	.2898	320	92.74	94.74
		360	104.33	106.33
90	.2990	320	95.63	97.58
		360	107.64	109.64
100	.3082	320	98.62	100.62
		360	110.95	112.95
110	.3174	320	101.57	103.57
		360	114.26	116.26
120	.3266	320	104.51	106.51
		360	117.58	119.58
130	.3358	320	107.46	109.46
		360	120.89	122.89
140	.3450	320	110.40	112.40
		360	123.20	126.2
150	.3542	320	113.34	115.34
		360	127.51	129.51

From the data given in the table a nomograph has been plotted. It will be noted that at 80° C field temperature, 320 and 360 field amperes at that field resistance will require 94.74 and 106.33 volts respectively at the switchboard. Lines drawn between these values on ampere and voltage scale will intersect at a point representing 80° C on the field temperature scale. Likewise, the values of field current and voltages for field resistance at all other temperatures will intersect on the field temperature scale. The points of intersection will fall on a straight line which becomes the temperature scale. Having constructed the nomograph it may be used to determine field operating temperature by laying a straight edge across field current and field voltage readings. The point of intersection on the temperature scale will indicate the operating temperature of field winding at the time switchboard instruments are read.

It will be recognized that non-salient pole machines will have fields of high thermal capacity and when the unit is under the control of a voltage regulator the readings taken at the start of an increase in load will show temperature from immediate previous operation, but under regulator control the voltage of field will be increased as the field winding heats up. For this reason frequent readings should be taken in the critical temperature zone.

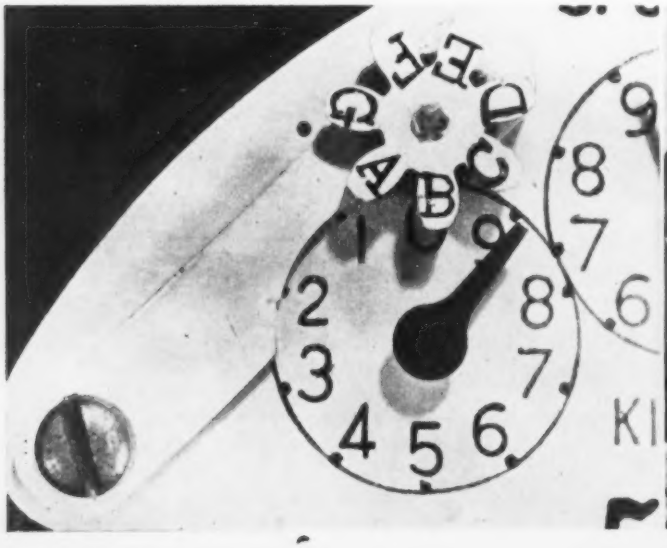
The exciter switchboard, used with the generator for which the nomograph has been plotted, is equipped with modern disconnect switches and field breakers with silver to silver contacts. With such modern equipment the voltage drop at a given current will not change and accordingly the compensation voltage value to be added to collector ring voltage will not change for a given current.

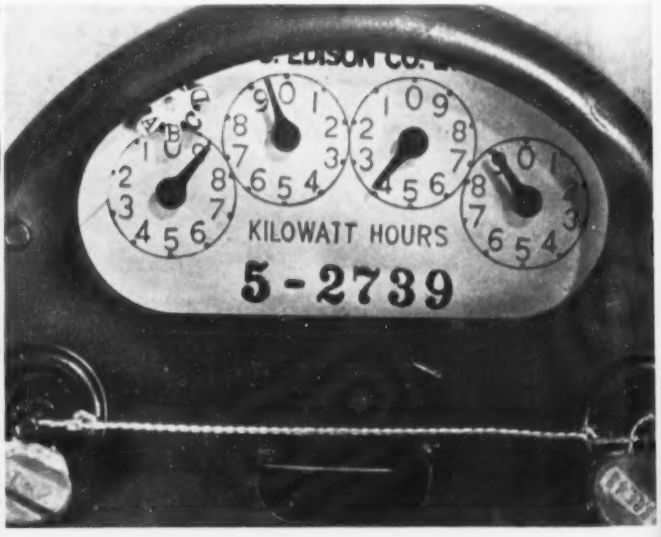
With older equipment, however, having copper-to-copper contacts on disconnect switches and field breakers, the voltage drop in the field circuit external to the collector rings may change due to oxidation of the copper contacts if not operated for long intervals of time. This factor should be watched. The compensation value of voltage drop in the exciter circuit external to the collector rings should be determined by test prior to maintenance on disconnect switches and circuit breaker. In this manner, switchboard readings will give field temperature indications somewhat higher than true values but will result in a safe error.

The temperature gradients between field windings and cooling air may vary greatly from the temperature gradient between stator winding and cooling air. Accordingly, the temperature rise on stator winding cannot be used as a guide to field winding temperatures. The field current required is greatly influenced by the power factor at which the generator may be operating. When there is a safe margin of temperature rise on stator windings, it may be found desirable to operate generators at increased field current for the proper control of voltage gradients between various generating stations of a system, as well as for the control of wattless between various generating units.

By the use of nomographs plotted for each machine, the operating engineer may find that he has available capacity in some generators not previously used and likewise he may find that some generators have been operated at harmful field temperatures and that the field current on such generators should be reduced.

The equivalent of a five-dial meter register has been developed by Southern California Edison Co., to meet the problem of meter turnover, especially on large agricultural customers under the company's wartime bi-monthly billing practice. The fourth or left hand dial of the meter turns a toothed, lettered indicator one position each time the hand passes through zero. The device is made in the company's meter shop and is held in position by one of the meter register screws. Ordinarily the problem would be met by installing a register with a multiplying constant of 10. However, the critical material shortage and the element of time would not permit the delivery of new registers in time





Electronics at Work In Industry—V

Fifth in a series on electronic tubes and circuits. Electronic regulation of voltage, temperature and speed within extremely close limits is accomplished with simple electronic device

E. W. Morris
Westinghouse Electric & Mfg. Co.
Los Angeles, Calif.

WHEN applied to regulation, electronics provides high accuracy, quick response, minimum maintenance and maximum stability. Electronic regulation can be applied to maintain practically constant voltage on a-c or d-c generators, constant temperatures in furnaces or ovens, and constant speeds on motors. In many Pacific Coast applications, these regulators now are doing jobs heretofore impossible, or which were possible only at greatly reduced operating speeds. The high accuracy provided by these regulators has increased both uniformity and quality of the product.

Regulation should be distinguished from *control* by the manner in which changes are initiated in the final output of a machine. *Control* of a motor, generator or any other device usually is considered as a change initiated manually by an operator, or automatically from some other source, such as a change in time, temperature or liquid level. *Regulation*, in contrast to control, maintains a circuit or quantity constant by means of feed-back at some predetermined setting. This regulation is provided over a reasonable range of load-torque if applied to a motor, or to any usual fluctuation in supply circuit voltage. In this application any indication of change in output of the regulated machine causes a feed-back into the supply voltage circuit to accomplish the desired regulation.

Voltage Regulation

This is best illustrated by referring to Fig. 1, which shows a simple electronic circuit for maintaining constant potential across a load from a d-c supply. The circuit consists of an amplifier tube "A" which has sufficient capacity to carry the load current. The potential drop across the load "L" is connected in series with a battery of the same potential, but of opposite polarity. This difference between load potential drop and battery voltage is fed into the grid of voltage amplifier tube "B." Current through tube "B" is determined by the resistor "R" and the potential on its grid circuit. The battery voltage is constant, therefore fluctuations in potential drop across the load are reflected as small changes in potential on the grid of tube "B," thereby changing its plate current. Change in plate current of tube "B" causes corresponding changes in the potential drop across resistor "R." Note that this is the grid resistor, the potential drop of which controls the flow of load current through tube "A."

As an example of the operation of this circuit, assume an increase in load current which increases potential drop across "L." This places a more positive potential on the grid of voltage amplifier tube "B," causing more current to flow in its plate circuit. This increases the potential drop across resistor "R," which is so connected that it makes the control voltage on the grid of tube "A" more negative. This reduces the load current to normal for which the regulator was preset. For the purposes of simplicity, the other bias potentials, potentiometers, etc., have been omitted from the diagram.

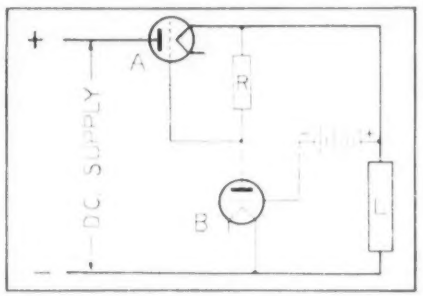
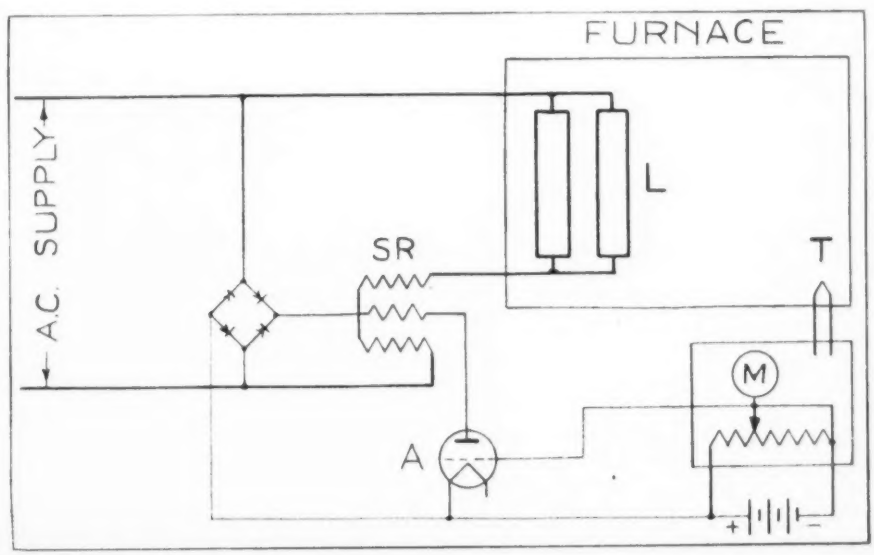


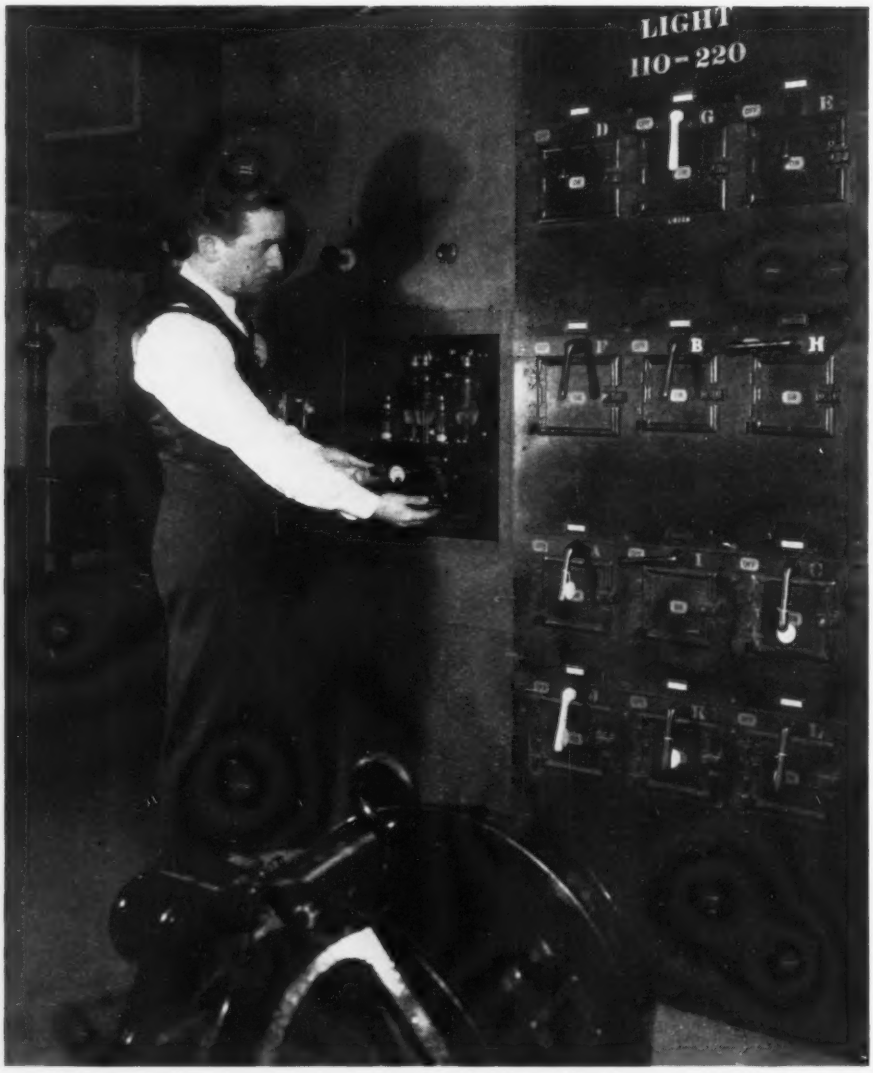
Fig. 1 (above)—Diagram showing simplified d-c electronic regulator circuit. Fig. 2 (below)—Electronic temperature control for an a-c electric furnace

Temperature Regulation

Temperature may be regulated in a similar manner, as illustrated by the circuit in Fig. 2. Assume an electric furnace with resistance heaters "L" supplied from an a-c circuit, in series with which is a saturable reactor "SR." This regulating reactor has a center winding which is supplied with d-c from a rectifier in series with amplifier tube "A." Temperature detector "T" notes any change from predetermined normal heat, and actuates motor driven potentiometer "M" to change the voltage applied to the grid of tube "A." This changes current through the d-c coil of "SR" to change load current proportionately.

To illustrate how this operates, assume an increase in supply voltage which increases temperature within the furnace. This causes motor driven potentiometer "M" to move to the right, thus increasing the negative potential applied to the grid of tube "A," which decreases its plate current through the d-c coil of "SR." This de-





Initial generator voltage is set by adjusting potentiometer of electronic regulator. Lamps in the film copying machine require constant voltage within one-half of one per cent total variation

crease in direct-current causes an increase in reactance of "SR," which causes an increased potential drop in series with the heater load, thus tending to restore normal temperature.

The early forms of electronic voltage regulators were built along the principles shown in Fig. 1, that is, an amplifier tube in series with the load or field circuit, supplied with potential from an external d-c circuit. The amplifier tube acted somewhat as a variable resistor, and in order to increase the circuit capacity it often was shunted with a fixed resistance. This type of regulator was limited in its capacity to existing ratings of vacuum amplifier tubes, and required a d-c supply circuit.

Improved Voltage Regulator

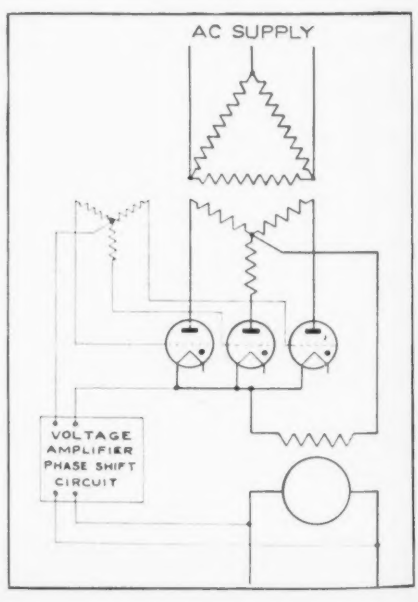
An improved type of regulator, the simplified diagram of which is shown in Fig. 3, has been applied successfully in many Pacific Coast industries, both for speed and voltage regulation. This device has overcome the limitations of the regulator described in Fig. 1, in that power is obtained from a three-phase 110, 220- or 440-volt circuit. It has the advantage of using thyratrons in a three-phase half-wave rectifier circuit. The terminal voltage from a d-c machine being regulated is fed through necessary potentiometers in series with an opposing battery potential, to a voltage amplifier. This much of the circuit is similar to Fig. 1. This amplified potential is used to control a phase-shift circuit in the grid circuits of the thyratron rectifiers. In this manner the amount of rectified field current is changed to compensate for reasonable variations in machine speed, a-c supply voltage and field resistance. Sensitivity of this type of regulator is $\pm$ .25%, when the variables mentioned above are maintained within 5% of nominal.

This regulator is applied to a-c generators by the use of a rectifier or a-c indicator connected to the machine terminals. Although the rating most frequently used has a maximum capacity of 1.5 amp. d-c field current, the line could be extended to use thyratrons of greater capacity. Ignitrons controlled by thyratrons can increase the available ratings. An electronic regulator of this type has been applied with Ignitrons to supply the main field current of a 30,000-kva. synchronous condenser, thus providing maximum sensitivity with high speed of response.

This same electronic regulator is used to control motor speeds within the same close limits. A small d-c generator similar to a tachometer is driven from the main motor whose speed is to be regulated. The output from this small tachometer generator is fed into the voltage amplifier of the electronic regulator. Speeds above or below normal are reflected by the regulator to decrease or increase speed to the predetermined setting. Speed regulation usually is applied to d-c motors which are part of a variable voltage system. The correction for speed variations is applied to the field of the generator in the variable voltage m-g set. This regulator has been applied successfully to such installations as paper machine drives, where close accuracy must be maintained to prevent breakage of paper when running over a wide range in speeds.

A necessary and desirable feature built into these electronic regulators is an adjustable anti-hunt circuit. Ordinarily the speed of response of electronic devices is so fast that the voltage or speed would tend to "over-

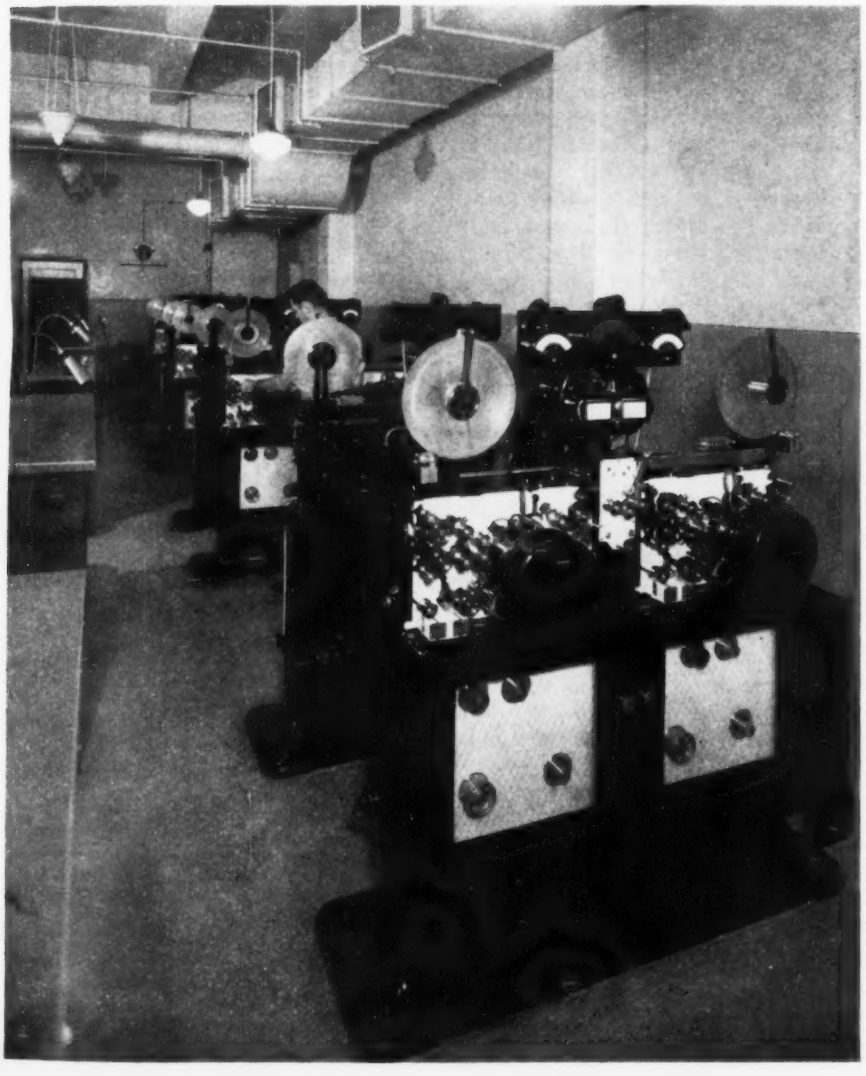
Fig. 3—Showing an electronic voltage regulator for a d-c generator with field supplied entirely by rectified current from an alternating-current circuit



shoot" if some damping action were not provided, such as a dashpot in mechanical regulators. In the electronic regulator this is accomplished by making use of the storage capacity of a condensor-resistor series circuit. Adjustment of the resistor varies the rate at which the condensor acts as a buffer to prevent too sudden changes in the regulated quantity, and is set sufficient, just to prevent hunting or "overshooting."

Large numbers of electronic regulators are applied in the film laboratories of California's motion picture industry, where the voltage on the printing lamps must be maintained within extremely close limits to insure uniformity and quality of the processed film. Generators thus regulated have replaced all other forms of printing lamp voltage supply in nearly every film laboratory of the country.

Battery of film copying machines where positives are printed from negative masters by passing unexposed film and the negative across a beam of strong light. It is these lamps that require regulated voltage to insure uniform exposure



Applying Electronic Control

E. H. Vedder
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Penn.

ELECTRONIC control is now used in a variety of ways as a component part of systems which are usually partly mechanical and partly electrical. Inasmuch as many functions may be done either electrically or mechanically, careful consideration must be given to coordination of the two elements to produce the best system. Electronics will live up to its publicity only if accepted as a work-a-day tool.

If allowed to become a gadget business, we have failed to utilize the tool properly. The gadget angle can be avoided only by critical survey of every application. Electronic control will do many things better, less expensively, faster, or more precisely, as well as do many things previously impossible. But electronics is not a cure-all, it is merely a new tool which must be properly used within its limitations. To illustrate the type of things for which electronics is suited, a few applications will be mentioned.

Motor Control

An electronic control has been developed which operates a d-c shunt wound motor from an a-c line and has other desirable features not previously available. It consists of a d-c shunt wound motor whose field and armature are energized by separate thyratron rectifier circuits. These rectifiers are so controlled as to vary the input to the motor, regulate the motor speed with smooth stepless adjustment, and to limit the maximum current furnished the motor during acceleration and reversal.

Resistance Welding Control

With electronic devices it is now possible to obtain accurately and repeatedly the exact amount of heat required for any type of weld. Spot and seam electric welding have been revolutionized by these electronic devices and it is now possible to perform operations with a speed, accuracy and quality heretofore impossible.

Light Control

Photo-tubes, sensitive to light, are widely used for actuating a system in response to a change in color, shade, density, shape, or position without mechanically touching the controlling object. Such devices seemingly perform miracles and their applications to industry are almost unlimited.

Conclusion

Only by close coordination of the electrical and mechanical design is it possible to insure that equipment will match in precision and reliability. If electrical and mechanical equipment does not match, a regulator with 1/64-in. accuracy may be attempting vainly to control a machine with 1/8-in. backlach, or a precision machine may base its value because of coarse control.

Electronic devices function with incredible speed, accuracy and versatility. Through proper combination of all three of the electronic tools mentioned, designers are unfolding new engineering accomplishments with amazing possibilities.

Light Questions Affect the Future

By seeking the answers each one may better plot his own plans for lighting development in a changed and new postwar environment

WELL organized thinking makes for better planning. Examination of every facet of a problem contributes to a more intelligent handling of it. So many new aspects appear in the field of lighting that it becomes especially important to analyze the entire situation before making many plans for the future. That applies to contractors, to dealers in lighting equipment and lamps, to wholesalers and distributors, to manufacturers of equipment and to the serving utilities.

Coordinated study of this lighting future by all concerned would be ideal. In some localities and in some associations this may be done. But whether it is done by a committee or an association or league or bureau or not, every person concerned with lighting and its future application will do well to survey the prospect for himself as well.

So much is loosely talked regarding the effects of hot or cold cathode, substitutes and changing trends that it is well to examine each of the many questions involved, assemble the facts concerning them, and upon this basis of facts, not mere opinions, design a course of action or a plan of operation for the future, when and as the war ends. The following may therefore be of help in digging out the facts necessary:

What Are the Facts?

The development of the postwar lighting market will be definitely influenced by the question—how profitable will it be to the various branches of the industry?

In this new market just ahead, to what extent will the utility, the wholesaler, the contractor, the retailer and the manufacturer profit? Based on profit return, how much developmental support can be expected from the various branches of the industry? For example, if the customer revamps from incandescent to fluorescent lighting on a watt for watt basis, it is true that he approximately doubles his illumination—but, can the utility sell this future market on this basis?

Should illumination values be higher? If so, what might be considered practical values for this territory? Will these higher foot-candles be comfortable based on present practices?

On a watt for watt basis, and many sales will be made on this basis, what agency of the industry will be in the best position to influence lighting practice for the future?

It is a conceded fact that changing practices, sure to come, will place new emphasis on the whole structure of lighting development and production. What are these changing practices?

Should the utility exert a dominant direct sales effort? Or should the utility serve as a cooperative coordinator only, endeavoring to secure industry cooperation for a united front?

In short, what studies can be made now to protect not only the customers' best interests but all branches of the industry as well, so that the lighting industry can grow profitably?

Perhaps it is a responsibility of some league or association to assume a position of leadership for the industry in the postwar lighting market. In order that member companies may intelligently plot their individual courses, yet agreeing in principle on a common goal, it will be necessary to have answers to the following questions:

Answers for These Needed

1. What profit is there in the promotion of lighting for the utility, recognizing that the manufacturing, wholesaler, retailer and contracting groups are bound to that promotion?

A. What is the average level of illumination in the territory served?
   1. Commercial
   2. Industrial
   3. Residential

B. Knowing A, what will practical increases in intensities bring through commercial, industrial and residential lighting in:

1. Kilowatt-hours	fluorescent vs. incandescent
2. Total kw. connected	
3. Fixture sales	
4. Lamp business	
5. Contractor business	

C. Knowing A., what will increases to present recommendation practice illumination intensities bring through commercial, industrial and residential lighting in:

1. Kilowatt-hours	fluorescent vs. incandescent
2. Total kw. connected	
3. Fixture sales	
4. Lamp business	
5. Contractor business	

D. To accomplish B and C, added information should be obtained on present installations.
   1. Knowing A, what are present kilowatt-hours from various types of commercial and industrial lighting installations.
      a. Fluorescent vs. incandescent.

E. What are some of the *plus* possibilities in postwar potentialities:
   1. Drying lamp applications:
      a. Potential customers
         1. How many?
         2. How big?
         3. Where are they?
         4. How many lamps to be involved?
         5. What are Kwh. possibilities?
         6. What drying lamp oven possibilities are there?
         7. What are the contractor's possibilities?
   2. Germicidal lamps:
      a. Assuming American Medical Assn. approval in hospitals based on A.M.A. recommended practices.
         1. What is business potential in the territory in:
            (a) Fixtures
            (b) Lamps
            (c) Kwh.
            (d) Contracting
            (e) Retailer
   3. Aviation lighting new business po-

No. 1 Question Guide

of a series the editors will present to stimulate more accurate analysis and intelligent planning for the future. Other phases of the industry will be similarly broken down into question outlines. By seeking the answers to these questions as they affect each reader or each branch of the industry, more successful plotting of future policies and programs can be done. Organized thinking produces more accurate and reliable results.

tentialities to lamp manufacturer, utility, fixture manufacturer, contractors and wholesaler in the territory:
a. Airways
1. Beacons
2. Course lights
3. Obstruction lights
4. Flood lighting high buildings
b. Airports
1. Beacons
2. Code beacons
3. Boundary lights
4. Obstruction lights
5. Flood lights
6. Contact lights
7. Range lights
8. Approach lights
9. Taxi guidance lights
10. Wind indicators
11. Ceiling height projectors
12. Building and apron lights

4. Railroads new business potentialities to utility, manufacturer, fixture manufacturer, contractor and wholesaler in the territory.
a. Railway shops
b. Passenger stations and platforms
c. Freight stations and platforms
d. Roundhouses
e. Yard lighting

F. Cold cathode fluorescent projected effect on lighting picture.
1. Where can it be applied?
2. What are its advantages?
3. What are its technical aspects?
4. What business building possibilities does it offer to:
a. Utilities
b. Contractors
c. Fixture manufacturers
d. Lamp manufacturers
5. What are its prospects for meeting with public acceptance?
6. What are the prospects of its being used to sell up in lighting intensity and quality?

G. What is the customers' desire for better lighting?
1. What do they think of as better lighting?
2. Do they want it?
3. How much do they want?
4. How much are they willing to pay for it?

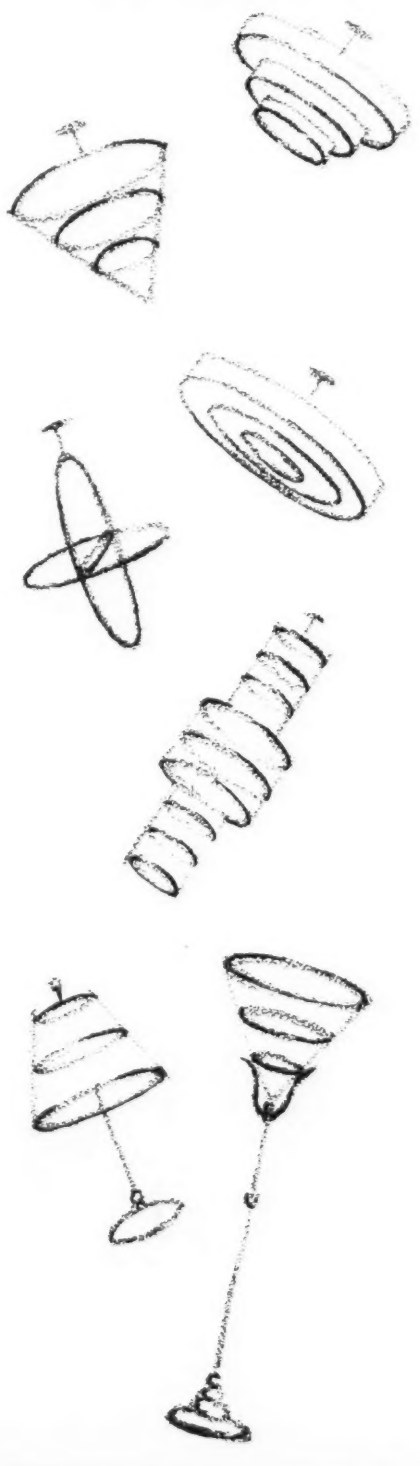
H. What immediate load-building possibilities are there in replacements or present outages?
1. Commercial
2. Industrial
3. *Residential

I. What will the territory postwar *new* residence lighting amount to?
1. New fixtures for light conditioning old homes.
2. New homes to be built:
a. Average size of house?
b. Number of lighting outlets per house?
c. Wiring per house?
d. Volume of lighting equipment per house?

II. How is lighting to be developed or sold post war?

A. Personnel in lighting industry post war
1. How much is needed?
2. What technical background is needed?
3. What sort of pay scale is necessary to support the right caliber of manpower?
4. Where will the men come from?
5. When will they be available?

A few of the design possibilities using circular fluorescent lamps announced recently by lamp companies



6. What will the division of manpower in territory be according to the following:
a. Lamp manufacturers
b. Utilities
c. Fixture manufacturers
d. Cold cathode fluorescent industry
e. Contractors
f. Leagues or bureaus

7. What sort of technical training should be offered by the industry—
a. For the industry?
b. For the buying public?
c. How shall it be sponsored?
d. By whom shall it be sponsored?
e. Where shall it be sponsored?

B. Promotion Post War
1. What kind?
2. By whom?
3. How much money should be spent?
4. When will the industry be ready to start?

*C. Residential survey
1. What is average wattage installed in units which were sold on a load-building basis?
a. Kitchen
b. Living room portables
2. What per cent of sockets in residences are empty?
a. Detached dwellings
b. Apartments and flats

Surveys Are Needed

To assemble the information indicated in the foregoing requires a survey. Such a survey would remove much of the haze from the too broad generalities surrounding much of the lighting scene ahead. Such a survey might be conducted by the utility. It would be better perhaps if it were done by the entire industry, each contributing information concerning various parts of the entire picture.

The results of such a survey, even if incomplete (for some of the questions may not have much of an answer worth while until after the war) should be made available to all in the lighting business. Future programs could be designed from the trends observed and the facts obtained.

In the postwar planning of lighting, this would seem to be the healthy and intelligent approach. May many groups in the industry institute some action from the suggestions, the questions, the classification of information that the foregoing outline stimulates.

● SCHOOL TEACHERS in Vancouver, and especially women teachers, have filed complaints with the Vancouver School Board that inadequate lighting of class rooms is having a bad effect on their eyes. P. A. Goeple, chief engineer for the school board, was instructed by the board to survey the situation and make a report regarding the possibility of installing fluorescent lighting in schools in Vancouver.

Critical Materials Saved on Ryan Job

Wiring in huge hanger type final assembly building in San Diego achieves maximum in saving of steel, rubber and copper wire

STEEL and rubber are critical materials. So when Ryan Aeronautical Co., San Diego, recently constructed its final assembly building, D. H. Palmer, plant engineer, went all the way in the conservation of critical materials in planning the wiring design. This was in keeping with the structure itself, an unusually large one of the open-hangar type, which was constructed entirely of wood. Even the long roof trusses were entirely fabricated of wood timbers.

For the final assembly of airplanes the building required a high level of illumination and accessible power for hand tools throughout the floor area. Electrical construction was installed by San Diego Electric Co. and Bruno Barth, its owner, described the installation as follows:

Power service comes in at 11 kv. to two unit substations with tailored switchgear, located over the toilet facility wings of the building. The 11 kv. is transformed to 110/208 volts. The substations contain two 300-kva. transformers for the lighting, one for 440-volt power, and all are pyranol filled.

The only conduit used is that in the concrete floor. This is 1-in. electric metallic tubing and it runs between precast concrete floor pits which are fitted with heavy laminated 2x3 wooden covers. Panelboards are all floor mounted. Asbestos lined wooden duct risers are used instead of conduit to take the lighting circuits up to a series of catwalks. These ducts terminate in plywood pullboxes, also lined with asbestos which is glued to the wood with what is known as an egg preserving compound.

Lighting installation is especially ingenious. The building roof is supported by exceedingly long timber trusses spanning the floor about 38 ft. from the ground. There are no pillar supports anywhere in the working area. This required the suspension of lighting units from the trusses and likewise required a means of servicing and relamping.

Accordingly catwalks were placed at intervals with a connecting catwalk at right angles to them all, at one end of the building. Twin 400-watt, 220-volt mercury lamps in Ivanhoe concentrating type reflectors on 18-ft. centers throughout the large area, 38 ft. from the floor, are suspended from hinged port openings in the catwalk at proper intervals. By lifting the catwalk port cover, access to the lighting units is obtained and relamping and cleaning can be done. Lighting intensity maintained is 45 foot-candles on the working plane.

The parallel members supporting the catwalk were used to fasten the knobbed weatherproof slow-burning wire feeders for the lighting circuits along the catwalk. Transformers for each pair of lamps were mounted on a truss alongside the catwalk.

In order to provide emergency lighting, one branch circuit goes from the first lighting panel to a single lamp, the last in the circuit, through a holding coil which in turn controls the night lamp in the next lighting circuit branch panelboard, and again in turn that one to the next. This provides a string of lamps on separate emergency circuits with a minimum of wiring and equipment.

The adjacent office building and cafeteria were similarly wired, using slow-burning weatherproof conductors, knob and tube, to feed the fluorescent lighting fixtures.

Careful installation, good workmanship, proper spacing and adequate fireproofing wherever necessary, give an assurance of long and satisfactory performance with the utmost minimum of steel and rubber as well as of copper. Barth declared it to be the most unusual industrial job that his firm had installed, one indicating the ingenuity which war conditions have made necessary.

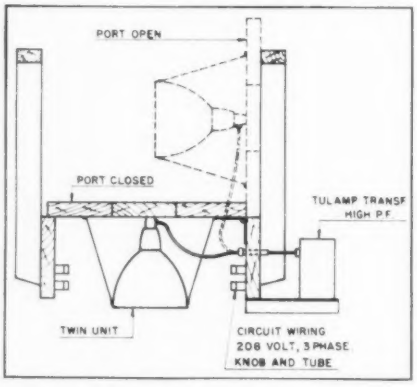


Diagram showing relative placing of lighting units and transformer and of knob and tube feeder circuits beneath

Military security forbids pictures inside the plant but here is a sample of the catwalk and lighting units made up to try out the idea before installation

U-V Plastic Filter

Development of a plastic filter which transmits invisible ultraviolet light from a visible white light fluorescent lamp yet filters out the visible light is announced by Lion Mfg. Corp., Chicago as the work of J. M. Gordon, fluorescent plastics consultant and research engineer. The plastic filter can be used with any size fluorescent tubular style lamp or circular type and is also available for the 2- and 4-watt RP-12 fluorescent airplane lamps and 4-watt T5 6-in. lamp. The filter and lamp combination produced costs less than other sources of black light produced by mercury vapor or carbon arc lamps requiring transformers and accessories. It is now used extensively in lighting up instrument dials in the cockpit of airplanes. Control of various light bands in different colors is also available with this filter material, it is announced.

● ONE OF THE CLEAREST and most easily understood booklets treating with how electronic tubes work has just been published by General Electric Co. and carries as a title, *How Electronic Tubes Work*. Illustrations show parts and where they are located.

Bridge Rail Light

California experiments with novel lighting scheme

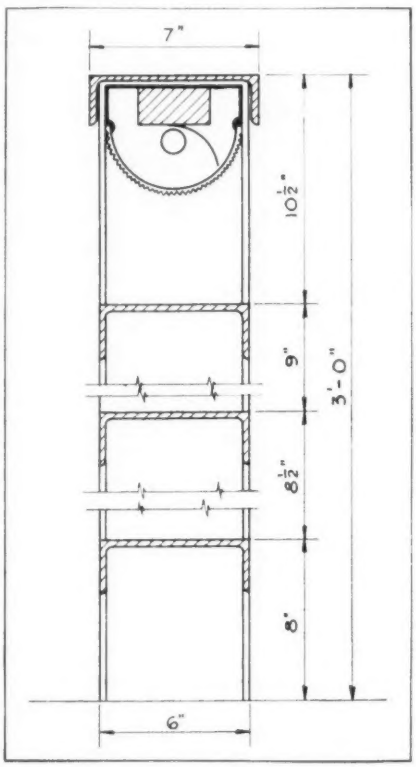
To light bridges and highways without glare into the eyes of the motorists has always been a problem. A novel approach to the difficulty is being experimented with by the bridge department, California Division of Highways, in the design of bridge illumination.

To do away entirely with lighting standards upon the bridge deck, usually extended from the handrail posts, a design is being developed to locate linear sources of light, either hot or cold cathode, under the handrail itself, as shown in the accompanying sketches. The linear light source located thus would receive the maximum security and protection. The level of the source would be below that of the eyes of the driver and thus shielded by the rail itself. A linear light source gives wide, even distribution. The reflector would direct the light along the surface of the sidewalk and the roadway, illuminating the opposite curb. Pedestrians and vehicles would be seen in sharp contrast.

Although the idea is in the try-out stage and particularly sources have not been decided upon definitely, the preliminary experiments give promise to success of the plan.

● Cold cathode fluorescent lamps will soon be available in fabricated lengths of 4, 5, 6 and 7½ ft. intended for use with available reflecting material such as sheet steel, plywood, pressboard or from white ceilings. These will be available to contractors for installation anywhere, according to the Fluorescent Lighting Assn., which has recently established F.L.A. standards covering lengths and white colors.

The availability of finished or fabricated lamps greatly extends the possibilities of this light in the industrial field. Up to now cold cathode has been strictly a custom-built lighting with lamps locally made. While custom-built will still be used for unusual lighting effects, in strictly utilitarian lighting the fabricated lamps represent greater convenience and uniformity. They also extend the market if contractors are able to make installations.



Cross section of bridge rail, showing location of fluorescent lamp, reflector and enclosing glass under the rail

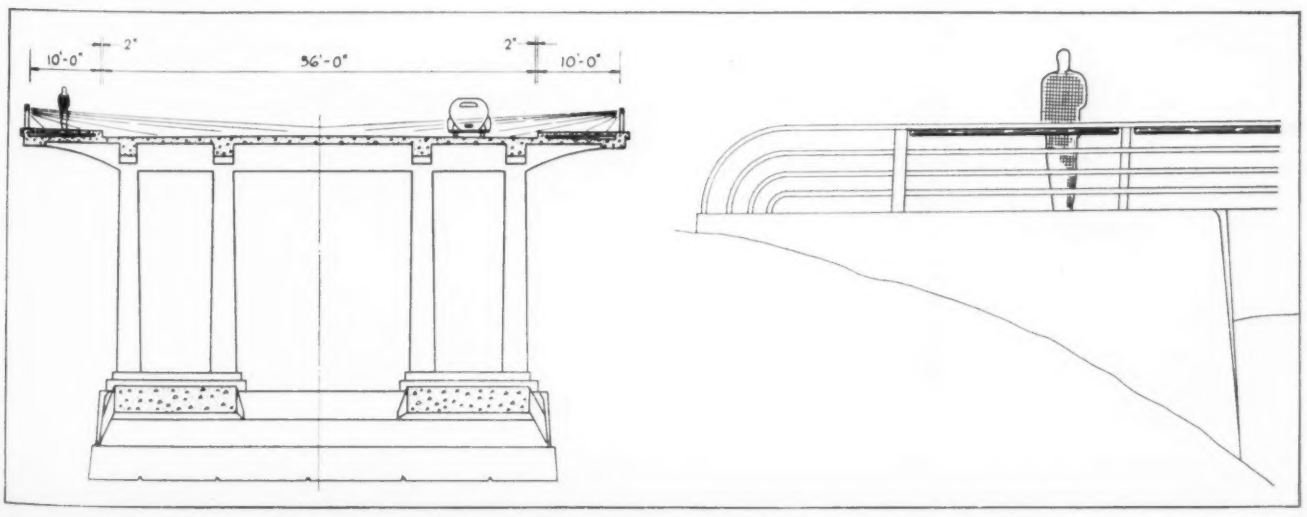
Tubular lighting units mounted in the bridge rail would throw illumination at below eye level as illustrated at the left. Side view, at right, indicates where units would be mounted

Newbery's 40th Year

Commemorating 40 years of electrical contracting in the West, the Newbery Electric Corp., Los Angeles, established 1903, published recently a handsome, well-illustrated brochure for select distribution to its customers. Always a company engaging in large-scale operations, it is perhaps carrying on wider operations at the present time than in any of its 40-year experience, with offices, not only at headquarters, 1038 Venice Blvd., Los Angeles, but in Phoenix, Ariz.; Salt Lake City; and a Mexican subsidiary at Cananea, Sonora, Mexico.

The brochure pictures the key personnel of the organization in large photographs. First are the executive staff and officer-directors headed by Glenn E. Arbogast, president and general manager and founder; R. E. Arbogast, his son and executive vice-president; a second son, W. W. Arbogast, secretary-treasurer; William Schack, vice-president and assistant general manager; Carlisle Bailey, manager of sales and of the shipyard division; and Ava Mahoney, assistant secretary-treasurer.

There follow six pages of pictures of the supervisory and executive staffs and of the marine division, followed by pictures of the engineering department, warehouses, stockrooms, offices, etc. and a two-page spread of the heavy equipment sometimes employed and a listing of equipment and tools maintained. An impressive summary of projects executed by Newbery over 40 years and including more than $50,000,000 worth of work follows, many of them illustrated on the succeeding six pages. The booklet ends with a map of the eleven Western states showing approximate locations of jobs and of offices and headquarters and an organization chart of the entire corporation.



EMEA *Dope Sheet*

Tips on Care of Resistance Welders

E. R. Spittler
Works Laboratory, General Electric Co.
Schenectady

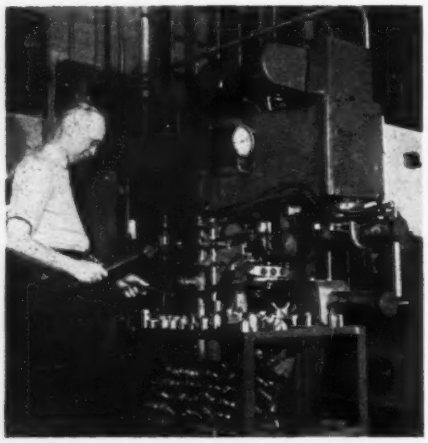


Fig. 1. Clean spot welder transformer

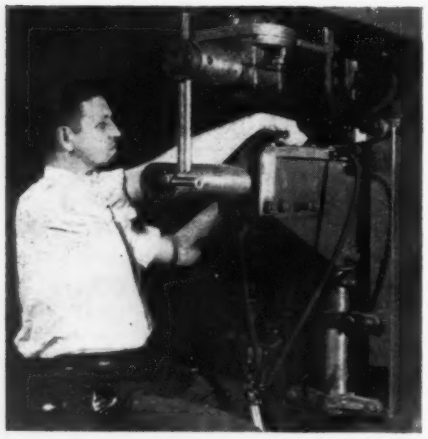


Fig. 2. Tighten secondary connections

Fig. 3. Reface disk electrode on lathe

RESISTANCE welders are an essential part of a plant's machine tool equipment. Consequently, they should be given the same consideration and careful maintenance as a milling machine, lathe, or any other precision machine tool.

Both welding quality and production requirements are so exacting today that no part of resistance welding equipment can be expected to deliver the proper standard or quality of work if it is in need of repair or adjustment. A regular schedule should be maintained whereby a periodic inspection can be made for parts that need replacement.

Obviously the object of this short article is not to give detailed recommendations on the proper maintenance procedures, but rather to point out those units that require special attention. Excellent detailed information on the installation, inspection, maintenance and trouble shooting of individual units can be obtained from manufacturers.

Transformer—If the welding transformer is water cooled, be sure that free circulation of water takes place at all times during the operation of the machine. Remove all dirt, dust and grit from the transformer and secondary circuit at least once a week (Fig. 1). An accumulation of flash particles will cause a short circuit in the transformer winding, thus reducing its efficiency, increasing operating costs, and eventually causing the transformer windings to burn out.

Switches, Contactors, Timing Devices—These are the nerve centers that control the operation of a welder and, consequently, must always be in good condition, mechanically and electrically, to assure efficient operation. They should be checked every two months for evidence of wear, such as oxidation at fuse connections in switches, loose electron tube sockets, and loose wiring in timing devices (Fig. 2).

Electrodes or Dies—Electrodes, welding wheels, dies or mandrels that have become burned or pitted with steel are a constant source of trouble. Frequently refacing the working surfaces of these electrodes is excellent insurance against poor welds (Fig. 3).

All electrodes and welding dies should be cooled by some method. If water is used as a cooling agent, a full flow should always be maintained while the machine is in operation.

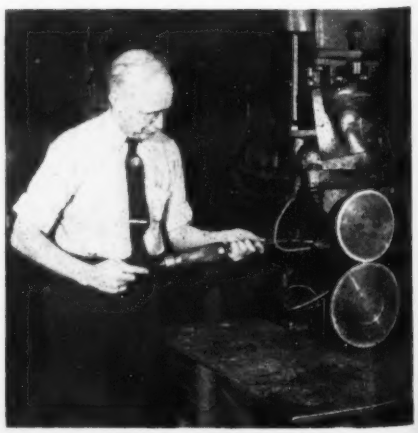
Clamps and Fixtures—The accuracy of the welded assembly can only be as good as the fixture holding it in place during the welding cycle. It is evident that close inspection and frequent adjustment of the fixtures must be made.

Motors and Drives—Motors, variable-speed drives, clutch and reduction units and transmission gears and shafts, being essential to the proper operation of the welder, should be inspected and adjusted or overhauled as often as necessary, the frequency depending on the production load.

Oiling—All moving parts must be oiled and greased at regular intervals to assure smooth, even motion and minimum wear (Fig. 4). Avoid dropping oil or grease on any of the electrical wiring or connections.

Pressure—All welding machines have some device for establishing welding pressure. Usually this consists of an air or hydraulic cylinder, or a cam or toggle with spring arrangement. This system should be inspected periodically and kept in perfect condition at all times. All air and oil filters should be cleaned at regular intervals.

Fig. 4. Lubricate seam-welding machine



Prequalify

Contractors must pass test for California license

IN anticipation of the flood of applications to enter contracting which may come after the war, and to protect the building public against incompetent, inadequate financing, or other defaults, the Contractors State License Board of California has revised its application for contractor's license, according to Roy Butcher, San Jose electrical contractor, chairman of the board. Experience over many years' operation dealing with the evils of unethical contracting practices, has caused the board gradually to tighten its requirements for licensees.

In the new application, the applicant must list the full name, title and address of the entire executive personnel of his company, in order that a clear record may be available to the public of any involved or syndicated combinations developed on special occasion or for specific projects.

A list of 26 questions must be answered by the applicant. These questions largely have to do with any previous record of bankruptcy, suspension or revocation of licenses, liens, suits or judgments. Also, questions are asked regarding the carrying of workmen's compensation insurance, registration of federal social security and, if so, account numbers must be given.

The twenty-fourth question is an experience record of the individual to be examined, or, in the case of a corporation, of its executives. This requires that within the last ten years immediately preceding the filing of the application, not less than four years' experience as a journeyman, foreman, supervising employee or contractor in the particular class within which the applicant intends to engage as a contractor are necessary before eligibility to take examination for a license. Four years of acceptable technical training may be substituted in lieu of required experience. Credits are allowed for additional experience.

On the back of the form are spaces for a report of the financial statement of the company at the close of business as of a certain date. This lists assets and liabilities and is required in order to establish financial responsibility to carry through contracts assumed by licensed contractors with the public.

While this contract application form is designed to protect the public against shoddy or incompetent contracting, it benefits the industry in a great many respects also. Competent contractors with adequate financing and responsibility are less likely to create a chaotic and irresponsible bidding market which demoralizes the trade and penalizes labor, Butcher declared.

First hospital train for the U. S. Medical Corps, used for training purposes in southern California before being sent overseas, is complete electrically even to built-in fluorescent lighting units especially designed for it by Sylvania. The entire train is so lighted

Maintenance Squadron

Maintaining of buildings and offices, because of the manpower shortage these days, perplexes many utility managements. San Diego Gas & Electric Co., by the organization of a "flying squadron" seems to have evolved a satisfactory method for this job. Operating for the past 12 months, a crew organized by Cliff Hansen, superintendent of buildings and grounds, takes each of the company's offices and buildings in turn and does a thorough renovating job from a special truck provided by C. D. Weiss, superintendent of shops, stores and transportation department. The truck is furnished with necessary material and supplies. Its foreman is an expert carpenter. With him are a painter and two or three other generally handy men.

A typical assignment starts with a survey of the work needing to be done by the foreman, Lew Heath. Repair work, such as fixing roofs, patching plaster, replacing hardware, etc., is done first. Old paint is removed, windows reputtied. Then follows a thorough cleaning job, windows washed, curtains and Venetian blinds cleaned, furniture vacuumed, floors scrubbed and waxed, appliances reconditioned, rubbish removed, yards weeded and raked as necessary. Office desks are repaired, cleaned and waxed, ceiling lights washed.

Much of the success of the crew is due to its harmonious personalities, their amiability and their quick and efficient way of handling the work.

Transformer Maintenance

Transformer maintenance should be one of the prime requisites of electrical maintenance. Upon the continuous operation of the transformers in an industrial plant depends the output of the produce manufactured. Therefore, it is up to the maintenance electrician to see that the transformer is properly maintained.

A regular inspection schedule should cover some of the following practices:

Temperature should be checked daily.

Voltage and load conditions should be checked to determine that the transformer is not being overloaded.

Transformers should be kept free from dust as much as possible. A layer of dust acts as an insulator and tends to store heat in the winding.

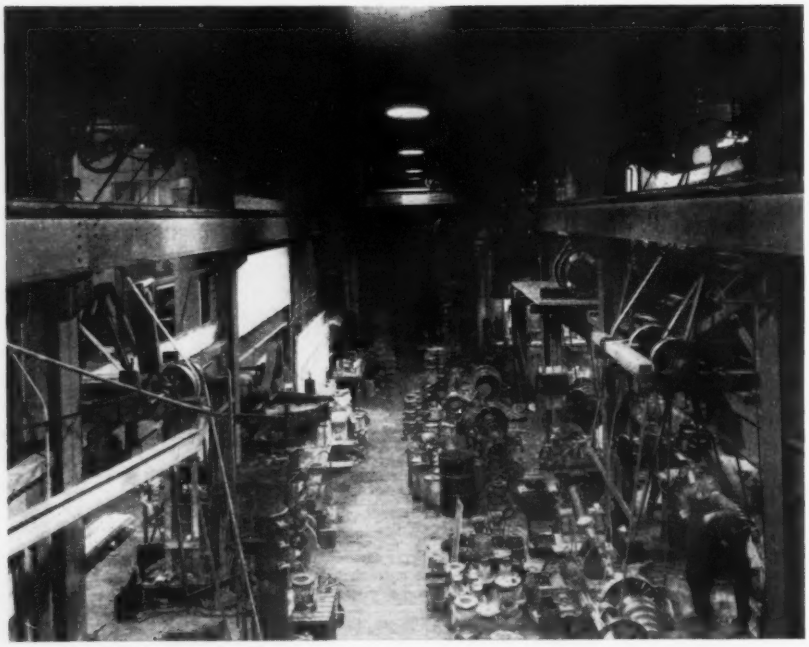
In liquid filled transformers the liquid should be kept at the proper level. Every six months a test should be made of its dielectric strength. A minimum of 18 kv. should be held, any value below this should be changed or purified.

Whenever the liquid is changed in a transformer, a megger test should be made of the insulation. On air cooled transformers this test should be made every six months.

At periodic intervals, preferably every six months, all connections on bushings and bus bars should be gone over and tightened. A loose connection will cause excessive heating and maybe a shut down.

Bushings should be cleaned and all corrosion removed from insulators.—*M. S. Morris, electrical maintenance dept., Lockheed Aircraft.*

● A 10-cent box of children's modeling clay solved a problem for two Southern California Edison Co. employees—Ivan Richmond and H. H. Bradley—when the former hit upon the idea of using it to take a nameplate impression. The nameplate was on a motor operating a customer's air-conditioning system and was so located that it could not be read. Several ideas, including use of a mirror, proved fruitless before Richmond produced the solution; modeling clay is now standard equipment.



Who

U. S. Pipe Mfg. Co., 187 Fremont St., San Francisco. Lighting layout by C. W. Macey, Pacific Gas and Electric Co., San Francisco division. Installation by Pacific Electrical & Mechanical Co.

The Need

Adequate illumination for two-shift operation of a machine shop, both general and local illumination to aid in critical seeing tasks, reading of micrometers and measurements, accurate machining of metals, reading of blueprints and specifications.

Conditions

High-bay craneway in center of an industrial type building. Much shafting and belting overhead. Area 7,870 sq. ft. Previous lighting from drop cords in tin can shields, home made. Intensities, general, 3 to 5 foot-candles, 20 to 40 f-c. on machines.

Installed

High-bay 1,000-watt, 18-in. RLM dome reflectors, lamped with 500-watt silver bowl lamps on extension sockets. Two 40-watt F lamp units over benches. Fostoria Localites on each machine.

Results

Average general intensity 22 f-c.; local intensities on work, 110 f-c. Improved morale of workmen, especially on night shifts, bettered safety conditions and increased production of war materials.

LIGHT for MACHINE SHOPS

Conditions

Original shop burned down. It was rebuilt and equipped for three-shift operation, even during a blackout. Skylights to admit daylight were equipped with sliding shutters for the night-time masking of skylights during dimout or blackout. Building 30 x 96 ft. Original lighting from a single row of twin 40-watt F lamp industrial units, six in all, down the center. Shop doing subcontracting of governmental orders for both Army and Navy.

Installed

Two rows of Holophane Lobay 500-watt units, 16 total, 6 ft. in from each wall, 18 ft. between centers and 12 ft. between centers the long way of the building, 2.8 watts per sq. ft. Fluorescent units mounted over some machines for extra local lighting.

Results

Before repainting interior illumination in service averages 28 f-c. over entire area. Painting expected to boost intensity. Everyone employed is well pleased. Even proprietor and owner have expressed their approval even though cost of additional current is noticeable.

Who

Hamburg Iron Works, Mount Vernon, Washington. Lighting layout by Ernest Brazas, industrial service consultant, Puget Sound Power & Light Co., Mount Vernon.

The Need

Light for machine work at a variety of machines where critical seeing is required for accurate measurements.

Draft Jitters

dominate the regulations changes of the month

WHAT the new draft calls of all men between 18 and 26 would do to every business was the biggest concern of the month in the field of regulations and war. Only the most super-vital of industries were to have any draft deferments of men in such an age bracket, and of those only the indispensible ones. So at month-end all organizations were busy making plans to reassign work, search for womanpower and physically defered, returned and discharged service men. Offer of permanent jobs is attractive to the latter.

● *With the oncoming refrigeration* season and mechanical refrigerators all one year older, this new shift in draft deferment threatened to cancel the help recent directives promised in the classification of such repairmen as super critical. Although expert refrigeration repairmen can be pulled from shipyards and other war jobs, this new draft of *all* men may siphon even these men. The parts situation promises to be better, however.

● *No hope of appliances* this year was given by George Watson, of OPA's durable goods staff, San Francisco, a former appliance man, upon his return from Washington. Even the promised 2,000,000 irons are in doubt because of manpower shortages. The fractional horsepower motor situation will prevent making washers or refrigerators, since airplane production takes all the capacity of small motor makers. Occasional lots of small appliances are dug up and placed on the market, but there is no real hope of new manufacture.

● *Policing of prices* at the wholesale level will be vigorous, Watson said, because this is where most of the abuses arise now. Such manipulations to increase price by shortchanging freight allowances, changing discounts, etc. will be tracked down. This year the need to hold the line against inflation will be the biggest home front fight against disaster.

● *Repair shops*, electricians, contractors are now given an AA-3 under CMP-9A to obtain repair parts and fractional horsepower motors from dealers, wholesalers or motor agencies. Such dealers are required to honor such ratings if their stocks are not needed to fill higher rated orders. Repair shops are urged to repair all such motors as rapidly as possible to alleviate the shortage.

● *To install equipment*, this same CMP-9A now provides for materials. Up to $25 in materials can be used to install ranges, refrigerators etc. This is strictly to be used for repair, not alterations or remodeling.

● *Public address* sound systems will be made available in limited quantity for industrial plants engaged in war work.

● *Batteries* for civilians seem to be as scarce this as last year. The armed forces are using increased numbers of dry cells.

● *Obtaining materials* for construction is now simplified by the issuance of a "Construction Limitations" list and a simpler form WPB-617 instead of PD-200. Only the naming of critical materials needed is required, not the full list of all materials.

● *Metal* will be used a bit more in industrial and residential and utility incandescent lighting fixtures. Industrial and utility fixtures can only be sold on an AA-5. For maintenance or replacement they may only be sold on an MRO AA-2. (WPB L-212 March 15.)

● *Wire prices* for cable, wire and accessories by wholesalers to industrial, commercial or government customers has been set by OPA at 120% of the manufacturers' net price to wholesalers in the same quantities, regardless of the number of sellers handling it.

● *Critical labor areas* added Ventura-Oxnard, Calif., to group I, and dropped Santa Ana back to group II last month.

Replace Cost-plus

Introduced into the House of Representatives as H.R. 4352 is a bill to replace the present cost-plus and other systems of contracting for public construction by a system of negotiated lump-sum contracts. This bill was evolved by Frederic W. Lord, prominent electrical contractor of New York City. Maintaining that the cost-plus system promotes profiteering, is destructive of efficiency and causes numerous ills to the construction industry as well as increasing the cost of war, Lord has made quite a campaign upon it through contractors' organizations throughout the country.

● ILLUMINATION engineering training is being neglected or eliminated,a survey of a hundred colleges and universities made by F. W. Wakefield Brass Co. has revealed. The company sponsors membership in the Illuminating Engineering Society for the top men in the illuminating engineering classes at universities. It found that since the war courses in communication are preferred to those in illumination.

Merchants Anxious

San Diego finds them wanting to plan future lighting

That the merchants of a town or city are anxious for information from which to plan relighting of their stores has been discovered by the San Diego Gas & Electric Co. as the result of a recent mailing to most of its San Diego downtown store customers. With a single mailing of a form letter enclosing a return postcard, 100 returns were received from a mailing of 1,500 letters.

Follow-up of these return cards has been occupying the lighting men of the company ever since. The letter offering advice or suggestions without any obligation or charge makes a statement that "postwar competition should be very keen; and good lighting is quite essential to good business. Some people are already working on postwar improvements or changes and we have had the pleasure of assisting them with lighting plans."

This letter also suggests checking present lighting in order to improve it from present sources by cleaning, replacing of burned-out bulbs, shielding from glare, etc. A statement also is contained that "we are in a position to plan incandescent, fluorescent, cold cathode or high-intensity mercury lighting installations." (A postscript is also inserted to install only high power factor lighting equipment.)

According to A. I. Benedict, engineer in charge of lighting, the returns have been from all types of business and in the interviews which have been conducted with merchants keen interest is displayed in planning for improved lighting as soon as equipment for it is again available. Benedict feels that this is a more direct and personal type of postwar planning program with the customers of his company than a broader survey type of thing and is appreciated by the customer as a personal service and an individual planning operation. It also gives the lighting men an opportunity to render service in the way of advice for getting more value from present illumination, avoiding waste in current consumption in accordance with the conservation program, and generally building a backlog of goodwill for the time when relighting can be done.

How About Postwar Margins

A utility man asks the questions that are on everyone's mind; a manufacturer answers

THESE were real letters. The editors were privileged to see them. Because they express so well the questions in the minds of dealers, wholesaler distributors and utility sales executives and, on the other hand, the real situation as viewed from the manufacturers' point of view, permission was obtained to reprint them.

Both have asked that their names be omitted, not because they would not stand up for their thoughts but rather that the discussion involved be read and judged on its merits. Realizing that there is a natural inclination to "apply a discount" because of company connections that in this case are not in the least involved, they agreed to give their thoughts free rein and to let these thoughts stand on their own. Any comments or further thinking along these lines will be welcomed by the editors and will be reprinted in the same spirit.

What about these reduced margins? asks the utility man

PREDICTIONS are so freely made these days that, in the postwar era, discounts to dealers and utilities and margins to wholesale distributors will be materially reduced. All kinds of reasons are given as to why smaller margins of profit to distributors and dealers must obtain, including meeting chain store and mail order house competition; the idea that the buying demand will be so great that there will be quick turnovers and small profits will make everybody happy, as well as prevent price cutting, excessive trade-in allowances, etc.

No doubt some of this thinking is based on the fact that the production of a low-priced refrigerator a few years ago resulted in unexpected sales, and no doubt a lot of this thinking is occasioned by threatened competition which did not exist a few years ago.

If the period following the first world war is any criterion, the old established manufacturers who have pioneered the field will have plenty of competition, at least for a time, and if small margins apply to legitimate wholesale outlets, many new forms and types of distributors will appear which will make it tough for legitimate distributors.

If my memory serves me right, following the first world war, something like 160 different makes of washing machines appeared on the market, which in time left a lot of "orphans" in the homes of our customers. Right today, in our territory, we are serving 46 different makes of electric ranges: 21 or more of these ranges being "orphans" and only 12 having jobbers or manufacturer's representatives locally.

I can therefore appreciate some of the reasons behind the thinking of our established manufacturers of electric ranges, refrigerators, water heaters and laundry equipment that smaller margins and quick turnover may help to solve some of the postwar manufacturing and marketing problems.

Frankly, this is not all clear to me and in order that I may understand the matter of smaller margins all down the line, I would like to ask some questions.

We ceased merchandising some time ago. Prior to that time, with discounts of approximately 40% from list, I am frank in saying that, with an outside sales organization, we were never able to break even in our merchandising operation, and in spite of many claims to the contrary, I know of no utility which did break even or show a profit if its costs were kept on a basis comparable to that of a regular dealer or merchandiser.

This brings up the question whether the utilities who intend to merchandise, presumably using outside sales organizations, will be willing to accept smaller discounts and absorb greater losses than in the prewar era, when it is reasonable to assume that utility operating costs of all kinds will be much higher and net earnings much lower than in the good old days.

As one of the non-merchandising utilities, depending on specialty dealers, department stores, furniture stores, etc., for loadbuilding through the sale of domestic appliances, and as a utility operating in an area which has mushroomed due to war production activities, we are wondering what effect smaller margins will have in this area.

There have been constructed thousands of houses and court type apartments to which utilities are supplying lighting service only because of War Production Board and FHA restrictions on wiring and because there were no electric ranges, refrigerators, water heaters or laundry equipment available. This means that these homes are largely equipped with Victory gas ranges and water heaters or other types of fuel burning cooking and water heating equipment.

Prior to 1942, the most aggressive and largest sellers of electric appliances were specialty electrical dealers selling only major appliances through crews of trained outside salesmen. Utilities helped train these salesmen and helped these specialty dealers in other ways, and they really went out after the business—an entirely different procedure from that followed by furniture stores, department stores and similar dealers.

With smaller margins can we expect specialty dealers to pay salaries and commissions to outside salesmen sufficiently high to secure good men and still operate such businesses at a profit?

If smaller margins prevent the employment of outside salesmen, the principal market for some time to come will be such new residence construction as may develop in the postwar era, because we have found that people building or buying new homes prefer electrical equipment and will buy from any type of dealer having the equipment they like.

During the years 1940 and 1941, 85% of the new homes erected in some parts of the West were initially equipped with electric ranges and about 50% with automatic electric water heaters. The utilities were rather counting on specialty dealers to convert a lot of homes with Victory gas stoves or wood stoves to electricity in the postwar period. They were also rather counting on specialty dealers aggressively promoting the sale of cold-freeze units, dishwasher sinks and many other items which will be very popular if pushed and if there is real competition for the consumer's dollar.

For a period of from one to two years after the war, I think we can expect that until production gets up to prewar figures, there will not be a problem of finding outlets but rather one of satisfying the demands of dealers for merchandise. The day will come, however, when we will be in competition with a great many other things, from automobiles to fur coats, for the consumer's dollar, and I hope that the margin of profit on major electrical appliances will be such that they will not take a back seat in this competition.

Organizations like Firestone will no doubt present a new type of wholesale distributor and a new type of dealer. I appreciate that large mail order houses sold refrigerators and other appliances on smaller markups than other types of retail outlets. I appreciate that

a good many concerns at the close of the war will find themselves with new and very well equipped manufacturing plants and will feel that the manufacture of some electric appliance or other will keep these plants operating, but I still have the feeling that established jobbers have rendered a real service, are not going to be displaced and will continue to render a real service in the postwar era.

Such jobbers and desirable retail outlets can only be maintained if they make a profit. For a while, no doubt, the demand for consumers' goods will be so great that, even if the margins are small, profits will accrue but, sooner or later, the old competition for the consumer's dollar will develop and, unless profits are adequate, desirable wholesale outlets and retail outlets will cease handling domestic appliances.

I appreciate that utility companies who do merchandising can probably absorb a reasonable amount of merchandising losses as loadbuilding expenses, but I question that they will go as strong in this regard as they did in prewar days. In spite of chiseling, price cutting, excessive trade-in allowances, etc., if we are going to have the type and quality of dealer outlets to properly represent the industry, they have to have margins which mean profits.

I wonder if a lot of the fly-by-night manufacturers who will spring up, a lot of the chain and other automobile type of distributors who may come into the picture and a lot of the new type of dealers who will be in the picture, will not in time again fade out as they did twenty years ago?

It all depends on competition, answers the manufacturer

IN the first place, I think the discussion of lower margins to retailers and wholesalers is strictly premature thinking and will not come about in the immediate postwar period. Naturally, all prices will be under control of OPA for some period following the war, and until these restrictions are lifted of necessity we will follow the rules and regulations as laid down by OPA.

Goods produced in the interim period, between the end of the European and Japanese phases of the war, of course will be strictly controlled; and if you have been following the Vincent resolution, which restricts manufacturers to 2% gross profit on goods, you will understand what I mean by regulations.

The disposition to date of the OPA to recognize other distribution costs has been briefly this: the distributor has been able to add his regular markup over manufacturer's cost which he had been accustomed to add in the base period in October 1942. The retailer likewise is enabled under present regulations to take his regular markup during the same base period.

Therefore, it would be reasonable to assume that the immediate postwar period will be one of regulations and will be out of the hands of manufacturer, wholesaler, or retailer, to alter the situation.

Assuming that regulations by OPA will end at the time that all manufacturers, wholesalers, and retailers can get into free and open competition, and without government regulations, the picture will change rapidly. Old line manufacturers will be faced by a tremendous increase in competition through Montgomery Ward, Sears-Roebuck, Firestone, Goodyear, Goodrich, Western Auto stores, Gambel hardware stores, and other chains in the making. If, as they have demonstrated in the past, they can deliver quality merchandise to the consumer at less distribution costs than our normal channels of distribution, then inevitably the goods will flow through these mass outlets into the hands of the consumers.

Retailers—utilities, department stores, furniture stores, and specialty outlets—who have been a factor in the past in distributing these goods, must be competitive, both in quality and retail price, to remain in the picture, and the realization of this fact is the reason for the present conversations concerning margins.

We as a manufacturer can produce goods at the same or lower costs than manufacturing concerns making brand goods for chain operators, quality considered. The difference between the manufacturer's cost and the cost to the ultimate consumer is primarily a distribution charge. A way must be found to be competitive, or any desire on the part of anyone in the industry to remain in business will end, because of lack of profit. So again, the lowering of margins both to retailers and wholesalers, will not be the act of manufacturers but will be occasioned by competitive conditions wholly.

The matter of fly-by-night manufacturers who will spring up in the business is recognized by all of us. The only thing we can do is to welcome them into the industry. In the meantime, the thousands of misguided people who will be induced to purchase these goods will have again to learn the lesson of the unwary, and I sincerely doubt that any law can be passed which would prevent a sucker from being a sucker.

We are following these matters very closely, and we are determined to maintain our quality and our prices as low as we can consistently ask our merchandising channels to handle these goods. The whole answer lies in a competitive program which may or may not follow the pattern just outlined.

Repairs Step Up

Finding increased interest in the care and use of appliances, the Bureau of Radio and Electrical Appliances of San Diego County has made available to dealers additional stocks of the booklet prepared by it last year. A counter card calling attention to these booklets is also furnished dealers. Small supplies have been placed in the district offices of the San Diego Gas & Electric Co., from which dealers may draw. As time goes on more appliances are developing trouble and the interest in their care and use increases accordingly.

In a bulletin to dealers J. Clark Chamberlain also told that after talks with distributors and manufacturers' agents recently returned from Washington and the East the question of whether washers and refrigerators will be produced this year at all is being quieted down by military leaders until they believe progress of the war makes it appear advisable. Publicity, they feel, would only serve to make the people feel the war is nearly over. Any production will be done quietly and distribution likewise and it will only be for relieving actual critical needs.

Dealer Plan Books

More than 14,500 retailers throughout the United States and Canada have applied for the monthly mailings of *Planned Electrical Merchandising*, issued by Edison General Electric Appliance Co., Inc., but in no way mentioning either the policies or the products of that company in the bulletins, according to G. H. Smith, general sales manager of the Hotpoint organization. The bulletins are based upon fundamentals which apply to all lines of business and were prepared by a retail merchandising authority. The first tells about planning for the type of store that will help sell, the second choosing a location, third, planning the type of business, fourth, identifying the store, fifth, floor arrangements and sixth, advertising. Announcement was also made that the bulletins are still available to any dealer upon request and the full series will be sent to them serially beginning with the first, one each month.

Traveling Displays

help utility retain customer interest

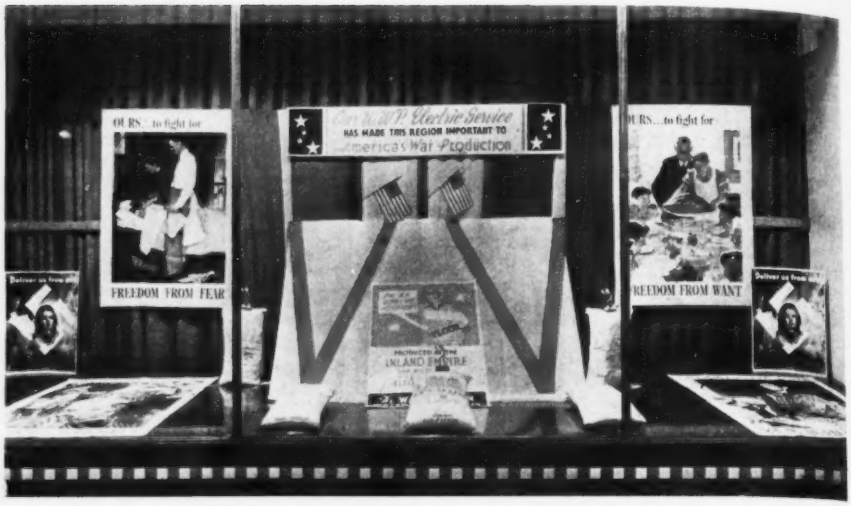
DESPITE war restrictions on gasoline and tires, the Washington Water Power Co. has been able to maintain its high customer interest in window displays.

With approximately 35 stores covering an area of some 30,000 square miles and a considerable distance between towns, wartime curtailments brought forth the problem of how to continue effective window displays. Previously a commercial service had been used with store windows trimmed by a professional man who also decorated other retail windows in each locality, but the shortage of gasoline and tires made the service no longer possible.

This situation was met by a company window man who each month makes up a window plan, prepares materials and sends them out along with instructions for installing. Occasionally the window director makes a tour of the territory to give personal instructions in installing the displays.

The subject matter during the past twelve months has covered a wide range of subjects such as company anniversary, free enterprise, power pool, War Bonds, taxes and Christmas displays, all tying in with current newspaper advertising.

Periodic survey checks made to determine the effectiveness of these displays reveal that within the past year 5% more customers have noticed store windows than ever before. Also numerous local newspaper articles have paid tribute to attractive company displays.



A wartime window display used effectively by Washington Water Power and made up from a plan prepared by a company man and sent to company stores

Wartime Idea Exchange

Nash-Kelvinator Corp.'s "Wartime Idea Exchange" is to be continued, according to the results of the first year's operation, as announced at a recent dinner in Washington attended by Nash-Kelvinator and by government food authorities. The idea enlisted the aid of suggestions from 2,100 of America's home economists from magazines, newspapers, utility companies, women's organizations, etc. Two hundred and two War Bonds were awarded for suggestions. The material gathered has been made available to homemakers through a pamphlet, *Homemaker's Helper* which has wide distribution.

● "Basically the silhouette of the range of tomorrow will not be changed," says Electromaster, Inc., in announcing that postwar range models are now being developed by industrial designer George Walker, "but improved to provide freedom from sharp corners, a more efficient top working surface, better illumination for more adequate visibility of cooking operations, and simple, quick identification of cooking controls. Controls will be placed to avoid accidental contact and will be designed for foolproof operation."

Appliance Estimates

Estimating that an annual average of 78% more electrical appliances will be sold during the first five postwar years than were distributed by it in either the peak years 1940 or '41, the Westinghouse Electric Appliance Division announces the results of the coast-to-coast estimates made by its 102 distributors, according to J. F. O'Donnell, assistant sales manager in charge of the division's Pacific Coast district. The survey covered thirteen appliances with average increases in sales for the first five years: refrigerators, 48%; ranges, 72%; water heaters, 118%; washers, 97%; ironers, 183%; fans, 29%; vacuum cleaners, 67%; small air conditioners, 138%; roasters, 36%; irons, 58%; small appliances, 66%; water coolers, 82% and dishwashers, 818%. Westinghouse also announced that an automatic washing machine would be one of its first postwar appliances, one which would automatically wash, rinse and remove water from clothes, weighing less than 300 lb., requiring no permanent attachment to the floor and vibrationless.

A new series of 1944 Conservice schools is also being organized by the service department. A number of ingenious demonstration boards to illustrate the operating principles of refrigerators and ranges using transparent plastic parts have been developed to aid in this program.

The "Health for Victory" sales planning program is being continued with monthly publication of meal planning guides of actual kitchen tested recipes and suggestions in line with the present-day rationing and availability of food.

● BECAUSE THE portfolio of available merchandise which was prepared by Harry L. Michaels, Albert Kessler and Albert Groeshel representing a group of exhibitors of the fourth and fifth floors of the Western Merchandise Mart, San Francisco, proved so valuable to the buyers at the recent market, plans are being made to reissue the portfolio. It will be mailed in June to retailers in the eleven Western states.

● ICE CREAM CABINETS formerly in numerous stores and shops which have closed are being reconditioned and sold in some places as frozen food cabinets. Frederick & Nelson, Seattle department store, advertises some of these with guarantee on the rebuilding. Prices advertised for the four- receptacle cabinet are $280, the six-hole cabinet $420 and the eight-hole cabinet $560.

● "JOYLAND" reads a big sign under that of Kelvinator on the store front of Dave Greenberg, Pittsburg, Calif., appliance dealer, and his store is filled with pin-ball machines, nickle-in-the-slot gadgets, games and play stuff. Greenberg probably wins the prize for having the most unusual duration substitute for the appliance business he used to run and which he is anxious to resume.

Sylvania Launches

dealer and distributor meetings on the Coast

THAT Sylvania is set up in the West now to render more complete service, with a full staff of engineers and consultants as well as warehouse facilities, was the purpose expounded in a series of three meetings held by the Sylvania organization during the visit to the coast of Robert Bishop, sales manager for the lighting division. Meetings were held in Los Angeles at the Jonathan Club March 13, 14 and 15; at the Mark Hopkins in San Francisco March 17 and in Seattle March 20 at Olympic Hotel. B. K. Wickstrum, Pacific Coast sales manager, who had recently established headquarters at 111 Sutter St., San Francisco, was accompanied by G. W. Field, manager of the California division, and George Connor, manager of the electronics equipment sales, accompanied Bishop on his Western tour. Field has offices in the Richfield Bldg., Los Angeles, for the headquarters of the California division.

In Seattle a Northwest division has been set up under Charles A. Dickinson as division manager, located in the White-Henry-Stuart Bldg.

Other Sylvania staff members announced during this series of meetings are J. S. Cassell, lighting engineer, formerly with Douglas Aircraft Corp., who will work out of the Los Angeles office of the California division, and Philip Carlstrom, formerly of the Kaiser Cargo Co., who will work out of the San Francisco headquarters. W. A. Patterson has been named manager of distributor sales in the California division for the radio division. Announcement was also made that warehouse stocks would be maintained in both Los Angeles and San Francisco on standard terms, which should save from three weeks to a month in delivery time to Western purchasers. As complete stocks as possible will be maintained in both warehouses.

In the radio division Robert Almy, Sylvania's manager of distributor sales, recently made a trip to the West Coast also at which time the appointment of Patterson was made. George Connor, a native of Hoquiam, Wash., who becomes the electronics engineer for the West Coast, was at Sylvania factories as chief engineer in the radio and electronics department. Because of the extensive use of electronic equipment in airplane manufacture and in the movie industry, Connor will make his headquarters in Los Angeles.

Fostoria Plant

A West Coast assembly and fabricating plant for Fostoria products will be opened about April 1 somewhere in the San Francisco Bay area, according to Ed Newfield, West Coast manager for the company. The plant will receive the parts from the factory at Fostoria, Ohio, assemble and fabricate them to expedite delivery to all parts of the West from Denver to the Coast and including the islands in the Pacific. The new plant will be owned by a Western group operating under a franchise from the Fostoria Pressed Steel Corp. with Ed Newfield in charge. The company manufactures infrared reflectors, adjustable lighting equipment for machine tools, fluorescent fixtures and is preparing postwar developments in the field of cold cathode lighting and high frequency equipment.

Crosley Ready

That Crosley is all set up for postwar distribution in the West was the word brought by N. B. Dinkel, Western regional manager of the Crosley Corp., of Cincinnati, Ohio. Dinkel makes his home in Alameda, Calif. While the company intends to be very much in the small automobile field, distribution of automobiles will be separate from that of its line of radios, home appliances and television equipment. Ray Cosgrove, manager of the appliance department, and well known in the West, feels that war will take all the materials available until the Japs are beaten, said Dinkel, and therefore the company is concentrating wholly on the war equipment it is making at the present time.

California Electric Supply Co., in San Francisco, one of Crosley's leading Western distributors, is at present surveying the field of dealers, making market surveys of trends and opportunities and is planning on an enlarged building adjacent to its present quarters in San Francisco as soon as the war ends.

Appointment of the Larson Distributing Co., Denver, as Crosley distributor in the Colorado territory was announced recently. The Larson company is headed by Otis L. Larson, who has been operating the business for 17 years. He formerly had the Kelvinator line and is now handling the Bendix automatic home laundry equipment.

Great Falls Paper Co., a 31-year-old mercantile and distributing company, will distribute Crosley appliances in the Montana territory. James J. Flaherty is its head.

● ADMIRAL CORP. has entered in agreement to acquire the refrigerator and electric range manufacturing divisions of Stewart-Warner Corp., according to Ross D. Siragusa, president, Admiral Corp. Stewart-Warner made seven refrigerator models, a line of electric ranges and a freezer locker. Both companies are at present engaged 100% in war production but the tools, dies, jigs, fixtures, trade names, patents, and patent rights of Stewart-Warner will go to Admiral for manufacture of these appliances postwar.

Members of Washington Water Power Co.'s Health for Victory nutrition class. From left: Maude New, Helen Caulfield, Jean Redman, Edith Gillogly, Lucile Ramirez, home service director, Edith Hedger, chairman, and Ruth Ryan

FTC Report Ready

The Federal Trade Commission has just issued Part IV of its series of reports on methods and costs of distributing important consumer commodities. In Part IV is included electrical household appliances and agricultural implements. Based on information supplied by manufacturers, chain stores and department stores concerning distribution methods and costs as well as reports made to the Bureau of Internal Revenue by wholesalers and retailers, and also drawn from information developed at various times by the commission through its economic and legal investigations of specific industries, the report should contain valuable information for the electrical industry. Copies of a summary of Part IV, are available. The full text is to be printed as a Federal Trade Commission publication and will be available by purchase from the superintendent of documents, Government Printing Office, Washington, D. C.

Train Repairmen

The appliance service department of Public Service Co. of Colorado is conducting service training in anticipation of increased necessity for the servicing of customers' appliances. John Kerr, in charge of training, is giving basic instruction in the repair of electric motors, refrigerators, ranges and other appliances to eighteen men. Refresher courses for some of the other members of the department are also being conducted. Arrangements also have been made through the educational department of the company for employees to take the various job training courses in cooperation with the Training Within Industry program.

● Marguerett Reinhardt, director of Universal's Modern Living Laboratory, former home service director of Idaho Power, has started a series of *Vitamins for Victory* nutrition-cooking schools for employees of Landers, Frary & Clark. These are used as a pattern for the company's program to consumer groups. Universal has also announced the reorganization of its customer service department to handle service problems, maintain adequate stocks of both current and obsolete parts, establish facilities for handling factory repairs promptly and at nominal cost, preparation and maintenance of parts lists and prices, dissemination of repair instructions and manuals to dealers.

● "Durationize" advertising is being resumed by Pacific Gas and Electric Co. as another indication of the growing public need for repairs of appliances.

● Treasure Trails of Melody is a new radio program sponsored by the Public Service Co. of Colorado from Station KOA at 9:30 p.m., mountain time, on Sundays.

Learning the lowdown of refrigerator repair at Public Service Co. of Colorado service school are Fred Richardson, Leo Wadsack and Ray Richardson

Frigidaire Repair

Frigidaire, in anticipation of greater demand for service to existing refrigerators, explains its program for dealers in a new 28-page booklet *A Wartime Plan for Maintaining Frigidaire Service*. Instead of the customary sales technique to be applied to customers, the 10-page "sales album" section is to be used by dealers to interest new men in becoming service employees.

The second feature of the book is a primary service training course in 24 lessons to be completed in three months or less. It is even designed to be used by an applicant while still employed elsewhere, in preparation for a service job. A set of nine training films, field schools with instruction by experienced factory and district personnel, refresher courses for experienced men and three handy pocket-size reference guides and two service manuals are part of the program.

To lessen the peak demand in summer, a preventive service program is also suggested for the winter months to spread the service work more evenly over the year and assure servicemen higher earnings. In the program, also, is an expansion of facilities for repairing and rebuilding of used parts, manufacturing of new replacement parts and distributing these through the service organization.

Seek Farm Customers

Asking for more rural line extensions, the Puget Sound Power & Light Co. has run large space advertising in the small town papers throughout its area on which was printed an application questionnaire. The advertisement states that "100% electrification is our goal" and the questionnaire says, "If you are one of the few people not enjoying electric service, fill out this questionnaire." Name, location and plotting of the farm or farm buildings on a squared map indicating sections and asking for the nearest public road are part of the questions asked. Principal agricultural products and what equipment the farmer plans to use when available is also asked.

● Youngstown Pressed Steel, maker of metal kitchen cabinets, sinks, etc. to accompany electric appliances in the making of complete kitchens, is setting up postwar plans for "selling centers." While all of its productive capacity is now devoted to war contracts, this company, nevertheless, is advertising and offering pamphlets and catalogues to homemakers and is receiving a flood of inquiries from homemakers who evidently are doing considerable planning for postwar home modernization.

Disposal of Government War *Plants and* Equipment

In the last four years, the Federal Government has spent over fifteen billion dollars on war plants – two-and-one-half times as much as was spent by private investors.

Of this fifteen-billion-dollar government investment, about one-third has gone into facilities for the manufacture of aircraft and for ship construction and repair; another third has gone into plants for production of combat ordnance; and the remaining third has gone into a variety of facilities for making synthetic rubber, metal products, machinery, and miscellaneous equipment.

Most of these plants are in industries that are expanded far beyond peacetime requirements. Furthermore, their convertibility to other civilian uses will, in many cases, be complicated by their specialized equipment and layout, by their tremendous size, and by their uneconomic location. At the moment, it looks as if roughly one-third of the government-owned plants and equipment can be converted fairly readily to peacetime operation, and will, therefore, be easily disposable to private enterprise.

The discovery of unsuspected uses for war plants and equipment may well raise the disposable proportion to one-half or more. The government, at the end of the war, may own about one-eighth of the commercially-usable industrial capacity of the country. It will be by far the largest owner of machine tools; it will own enormous aluminum capacity, magnesium capacity, many miles of pipe lines, and more ships than the entire private shipping industry.

What the government does with its war plants will have a profound effect on the free enterprise system and on all workers, employers, investors, and consumers who have a part in that system. If this problem is handled badly, we may find ourselves enmeshed in a trend toward monopoly and government operation of industry. If the problem is handled well, we shall have taken a big step toward freedom of action in a competitive society, toward full opportunities for business enterprise, toward well-paid productive jobs for workers, and toward a higher standard of living for us all.

Recently, three important events have signalled encouragement. They are the report of Senator George's Committee, the Baruch report, and the report of Senator Truman's Committee. These reports are noteworthy for their competent sizing up of a complex problem, for their recognition of the major responsibility of government in making a successful transition to peace, for their insistence on wise policy and good administration, and for their genuine concern that our productive powers be given full opportunity in a free private enterprise system. These reports agree on basic principles and many specific lines of action. There are, however, important areas of policy formation, organization, and procedure—especially in regard to plant disposal—which remain to be blue-printed.

In formulating the policies and practices to be followed in dealing with government war plants, our major goal must, of course, be a high level of production and employment in private business after the war.

Government operation in competition with private employers and privately-employed workers will not be desirable because it will make investment unattractive to private capital and will limit opportunities for private employment. On the other hand, sales to private buyers which result in increasing the concentration of industry will also be undesirable. We must use this opportunity to strengthen the competitive enterprise system and to move away from, not toward, the concentration of economic power in either public or private agencies.

To accomplish these objectives, a program of action such as follows will be necessary:

1. An adequate reconversion organization will be needed in the government, but its powers and responsibilities should carefully be defined by Congress. Fortunately, an able Administrator of Surplus War Property already has been appointed. It will be essential for him to work in closest cooperation with Congress and with the Armed Forces and other executive agencies. The Office of War Mobilization, and ultimately the President, must be responsible for seeing that the Surplus War Property Administration is not sidetracked by the operating agencies and is not dominated by their sheer size. Funds must be supplied generously to the Surplus War Property Administrator, so that he can set up an organization adequate to cope with this huge and complex job. Business, too, must be generous in loaning top-flight executives for postwar government service.

2. One of the first acts of the Surplus War Property Administration will have to be to assemble a complete inventory of government war plants and equipment, to make possible the planning and control of the disposal process, and to form the basis of catalogues of property available for sale.

3. Cooperation between the executive and legislative branches of the government will be needed to develop at least tentative plans with respect to matters of public policy which are of special importance to a successful transition to peace. Among these matters are the size of the military establishment to be maintained in time of peace, the stand-by facilities and reserves of materiél necessary for our security in case of future war, and our policy regarding import and production of synthetic rubber and other critical and strategic materials.

4. The Surplus War Property Administrator should

obtain from the Armed Forces, acting under congressional directives, specification of those plants which are needed to supply our peacetime Army and Navy and to provide the essential reserve capacity in case of war.

5. The Surplus War Property Administrator should select certain war plants as depots in which to store the huge surpluses of inventories and equipment which will have to be removed from private and government-owned factories in order to make possible their conversion to civilian use.

6. Those plants which are not desired by the Army or the Navy, which are not needed for storage, and which clearly will be unsuitable for peacetime utilization should be scheduled for dismantling and disposal piecemeal.

7. The two or three billion dollars' worth of government facilities intermingled with private plant should receive attention with a view to early sale, temporary continuance or use under lease, or early removal.

8. The various plants and pieces of equipment available for sale to private business should be classified conveniently, catalogued, and advertised to prospective buyers or lessors. Before the Surplus War Property Administrator offers, for private sale, plants and equipment not desired by the Army or the Navy, he should ascertain whether the plants or equipment are desired by other branches of the government or by public corporations such as the T.V.A.

9. Whenever property can be sold at prices approximating depreciated reproduction cost, that will be by far the best solution. Generous time-payment terms should be offered. In many cases the government may be unable to sell the property for reproduction cost less depreciation, for the simple reason that no one would think of reproducing it. The property may already be partly obsolete or, because of its size, location, or other characteristics, may only be moderately well suited for commercial use. This should not prevent the government from selling it, provided a price which fairly represents the worth of the property can be obtained. The best test of that worth is the price produced by active bidding under favorable market conditions.

10. When property cannot be sold at a fair price, temporary leases with options to buy should be employed to get the facilities into productive use. This should not, however, be done on terms which would cause unfair competition or create clearly excessive capacity in an industry. And the lease must be temporary; it must not be the means to prolong government control or ownership.

11. The government should offer the strongest possible resistance to local groups or industry groups seeking subsidies for continued operation of war properties. Subsidies will burden the Treasury and lead to inefficient use of resources. They will be justified only to maintain facilities needed for national security.

12. The plants and equipment offered for sale and lease should include sufficient quantities in small enough lots to satisfy the demands from small business. The war has tended to concentrate production in larger plants. After the war, we should seek a wider distribution of the government war facilities.

13. Insofar as possible, war buildings and equipment should be offered for sale in units which can be purchased by businesses in peacetime industries. Many of these industries have had to get along during the war without adequate replacement and expansion, and will be ready to buy if they are able to get what they want from the government. This is a particularly desirable market for surplus government property since these industries are, for the most part, not faced with the problems of excess capacity.

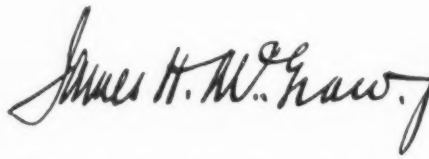
14. Property, such as machinery and other movable equipment, which is in excess of our domestic requirements or is more urgently needed by other countries, should be exported. We shall need, and can take, large supplies of raw materials in return.

15. Property which is not needed by the Armed Forces, which cannot be sold or leased on terms which would be fair to competing plants, which cannot be dismantled and distributed piecemeal, and which cannot be sold abroad, should be scrapped as soon as its non-disposability is apparent. The disposal of war plants should be completed within three to five years.

16. All negotiations for sale or disposal should be matters of open public record. As Mr. Baruch has said, the process must be conducted in a goldfish bowl. This is as much for the protection of business as for the protection of the government.

These courses of action do not include everything that must be done, but they do indicate the general lines along which our surplus war plant disposal must proceed if it is to avoid precipitating needless transition unemployment.

The gravest danger of all will be red tape, intergovernmental conflict, and inadequate administration. It would be a great misfortune for the executive and legislative branches to quarrel over details of organization when they agree on the basic principles to be followed in handling the problem. Obviously, the Surplus War Property Administration must cooperate with Congress and look to it for policy guidance. Just as obviously, the disposal problem will involve great difficulties of administration which must not be complicated by congressional interference. We shall need the best we can get in careful policy making, detailed planning, good organization, and courageous action. This is a matter of vital importance to every American. The stakes are too high to tolerate poor administration or petty politics.



President, McGraw-Hill Publishing Company, Inc.

Frozen Foods and the Farmer

Future developments in this field will influence rural electrification; farmer already is consumer

Thor W. Christensen
Pacific Gas and Electric Co.

WHERE does the farmer stand in relation to the promised development in the frozen food industry in the period following the war? As a producer and a consumer he can occupy an important position. Whatever he does will influence future rural electrical development. Any initial activity very probably will be in the field of freezing and frozen storage on the farm itself.

The cold storage industry has grown to large proportions because the business had both a psychological and a commercial attractiveness. Storing up, during periods of plenty against time of scarcity, gives a feeling of security; commercially it is good business; it stabilizes prices, saves perishable products which might otherwise be wasted and permits the consumer to enjoy year-round supplies of a variety of fresh foods.

The farmer is aware of this. He furthermore feels keenly about another economic factor of considerable importance. All of us at various times have seen entire crops go to waste—rot on the ground, wheat plowed under, little pigs killed, fruit spoil and farmers paid for not raising crops. We have read, too, that large areas of new land will be opened up to produce more food in the postwar era when what we probably need most is more preservation to permit maximum utilization of what we produce now. Frozen storage offers a solution for at least part of this problem, not only on a national basis, but for the individual.

The farmer has been responsible for the origin of the locker plant. Expansion of the freezing and locker business during the past five years has been phenomenal. It is indicative of what can be expected in the future. Here are some facts about the frozen food and locker business which will have a bearing on postwar development:

At the beginning of 1943 there were approximately 5,000 locker plants in the United States with an average capacity of 346 lockers each. They were serving an average of 288 families per plant, which would add up to 1,730,000 lockers serving 1,440,000 families. It was expected these plants would handle an estimated 865 million pounds of food during 1943.

It is estimated that there are probably not over 50,000 home lockers in use in the entire U. S.

Of the 40 million housing units in the country only 18 or 19 million have ordinary domestic refrigerators, with very limited frozen food facilities.

Prior to the war eight companies manufactured 80% of all refrigerators sold. Some 4,000,000 refrigerators were sold in 1941.

Many food stores now have a frozen food cabinet from which frozen foods are dispensed.

Manufacturers believe that it will be possible to build two separate boxes, a low-temperature storage box and a domestic refrigerator as cheap as they can build a good combination two-temperature single unit.

National merchandising concerns are negotiating three-way deals with packers and grocery chains to sell frozen food, cabinets, and frozen produce.

Manufacturers are conferring with locker operators on the sale of home units through locker plants.

There are approximately 400 plants freezing foods commercially in the United States. These plants froze over two billion pounds of food in 1943. This does not include foods frozen by locker plants, which was almost another billion pounds.

It is anticipated that some of the wartime dehydration plants will convert to frozen food production after the war.

Three large meat packers with nationwide facilities are planning the sale of boned-out packaged frozen meats. About 40% of the weight now shipped is represented in waste, bones, fat and trimmings. This could be eliminated by trimming and boning-out meats at the packing plant. The packing industry is boning-out millions of pounds of meat for the Army. Doing the same for civilians is not far away.

Fresh frozen fruits and vegetables require less hauling and shipping space whereas the movement of fresh fruits and vegetables in bulk requires considerably greater shipping space. In transportation of fresh fruits and vegetables much inedible waste matter must be moved. The percentage of shipping and storage weights edible in 50 million pounds of food stuffs, is as follows:

Quick Frozen—89% edible (11% container material.)

Canned—43% drained food weight (57% waste and container material.)

Fresh—30% edible (70% waste inedible and shipping container.)

The number of railroad cars required to enable 50 million pounds of food to reach their destination:

Quick Frozen—1,550 carloads.

Canned—3,200 carloads.

Fresh—4,658 carloads.

Elimination of waste at the source offers the possibility of increasing in considerable degree the sale of many products.

Frozen cooked foods are a definite possibility after the war and even now are increasing in number of products and volume of sales. The following products are now being produced: chicken a la king, chili con carne, baked beans, lima beans, corned beef hash, clam chowder, vegetable soup, green split pea soup, navy bean soup and spaghetti dinner.

However, frozen cooked foods will come more slowly and will require development of a technique about which little is known at present. Cooked fats are less stable than raw fats. Cooked foods are more susceptible to bacterial spoilage than raw foods because they are already partly predigested. Extreme sanitary conditions and efficient cooling systems are required.

Nevertheless frozen cooked foods will come into the picture in a large way because they represent utility and convenience to the customer. Their use may require the development of special equipment — table appliances perhaps, in which frozen cooked foods can be heated, ready for use in a minute or two. Whole meals may be put up in one package and handled the same way. Some frozen food operators are already studying this market.

Others in the frozen food industry are investigating the possibility of providing apartment houses with small locker installations in which the apartment dwellers will have a complete assortment of raw or cooked foods which would be replenished weekly by a frozen food delivery service.

Canners and jam makers are looking at freezing and holding as a means of getting better plant load factor or even year-round operation with smaller plants.

Farmers see possibilities of bulk frozen storage on the farm as a way toward efficient marketing and saving of crops. Farmers also see possibilities for 100% utilization of their crops, not merely grade A-1, triple fancy deluxe, but also lower grades through conversion into marketable products.

*Extracts from a discussion before the sixth annual California Rural Electric Conference.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

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Wartime Regulation

NOT the least of the postwar problems of power companies serving war production areas will be the deflation and integration of facilities, load and revenues stemming solely from the war. Where war-invoked growth has been particularly large, the jolt can be serious.

Some recognition of the problem and its possible postwar effects has been given by the California Railroad Commission in its rate order reducing schedules of the Vallejo Electric Light & Power Co. The company experienced a 33% growth in less than three years, mostly occasioned by expansion of activities of a navy yard. In its order the commission took cognizance of this expansion by providing for a three-year write-off of certain investment made to serve war housing facilities. Also in ordering a $135,000 reduction, the commission made due allowance for possible postwar emergencies by specifying that some $65,000 should take the form of a 10% discount on current bills. Such a flexible arrangement would permit future upward revision by eliminating the discount should a change appear justified.

In making due provision for these two special problems, the California commission shows that regulation is keeping step with the war.

However, a phase of the decision which is open to some legitimate question is that dealing with federal taxes. The decision refuses to admit the validity of wartime excess profit taxes and states that the reduction ordered will cut earning to a point where no such tax payments will be made. The reasoning expressed by a concurring opinion is that war taxes should not be considered as an operating expense and passed on to the consumers. If such an argument was carried to its logical conclusion, a natural question would be, "Who pays for the war anyway?"

In Lieu of an "E"

IN the National Gallery of fame for "outstanding war service and achievement" in industry, the electric utilities do not appear among the glamorous pin-ups gracing its stately walls. To those distributing "E" awards the power companies have not qualified for even one little, inconspicuous lower-case e.

Yet when American industry furiously galloped off in all directions at once to convert plowshares into jeeps and Bobby pins into Tommy guns, the electric light and power folks took the suddenly quickened tempo in stride. They didn't have to jerk their production lines to a sudden halt. They didn't have to retool. They didn't resort to hybrid kilowatts, adulterated with soy bean plastics and other substitutes. The war simply became a new and bigger customer for them.

When the "imminent-shortage-of-power" prophets shouted "boo," their chatter was drowned out by a countrywide hum of already-built equipment geared to produce millions more kilowatt-hours—if, as and when needed. The utilities were providently plugged in, ready for the power crisis before it became one, which it didn't.

Supreme war honors, rather than a few scattered compliments and token awards, might have descended on the power companies in quick order had they dramatized themselves a bit. Possibly they should have conveyed some convincing appearance of straining their facilities to the utmost, huffing, puffing and growing red-faced with their exertions. Instead they were too modestly ready, too willing and able to respond to war demands with deft, push-button simplicity and speed.

One might rightfully judge that the power company folks are running the wrong kind of a business, at least to receive public approbation. Were this not the case those who have the power to grant recognition of even the tiniest effort toward the success of America's effort in the current world-wide shooting match, would cast some sort of medal for the utilities. However, instead of honors ceremoniously conferred by some dignitary in full regalia, the most a power company probably can expect is a court citation unceremoniously served by a plain-clothes deputy, and command-

ing the company to "show cause" for something.

Compassionately General Electric did pin a rose on the industry by the group award of the coveted Coffin medal. But the industry didn't know how to return the deserved salute because it had never had occasion to do such a thing. Even though this award was solely a family affair, the utilities can take heart. The rest of the industry knows and appreciates the great job they are doing. And the industry's plaudits are genuine and sincere.

"Inspectors' Problems"

ON the program of the annual chapter meetings of the electrical inspectors of the Rocky Mountain, Utah and Montana chapters, this month, as it is on the the program of all similar meetings, is a title, *Inspectors' Problems.* Once that inclusive title provided discussion among inspectors as to the causes for a breakdown of some piece of equipment, a shade of interpretation to a section of the Code or some experience in the local administration of licensing or inspection procedure. In those days the trend of materials and methods was toward the better, the improved, the safer.

Today when inspectors meet it is to discuss as problems whether some drastic substitute will stand up during the war, some shortcut or omission will really affect the over-all safety too greatly. The trend is in reverse.

This is a period wherein the surplus is being used up, whether it be of copper carrying capacity or blood plasma. With a comfortable factor of safety inspectors could rest nights, secure that electricity would not get out of hand. With the safety edge shaved to the thinnest point, more vigilance is necessary.

These real concerns bring the inspectors and the trade together in meetings this month. Out of the exchange of views their work may be made less of a lone gamble in these trying times.

Take Off Your Tie

ADMIRAL NIMITZ, realizing that special loyalty to a branch of service might influence a man to place it above the greater loyalty due the nation as a whole, instituted two subtle changes in the South Pacific. One was to make khaki the standard uniform for Navy, Marines and Army, only the tie worn differentiating the wearer as to his own branch of service. The Navy tie is black, the Army is tan, the Marines is green. But when a general staff conference is being held, Admiral Nimitz usually suggests, to be more comfortable, that each man remove his tie. In this subtle way he brings all of them together as a common team, doing a job in unity for the best interests of the United States, regardless of the branch of service each is in.

There used to be criticism of the British army because of its "old school tie" traditions, but the common danger of war has removed practically all of that. A prominent British writer recently remarked that it surprised him to find more formality in the American Navy today than in the British. A common cause brings all men closer.

Westerners have usually been more informal than those in older regions of the country. The electrical industry in the West has made great progress because of the friendly *esprit de corps* of all in it. The best things the industry has done have been done "regardless of tie." Most of the difficulties facing the industry can best be mastered if those in each branch remove the ties that differentiate them and get down to working on them as a team.

In a larger sense the problems of the country itself need the removal of class distinction and special grouping to work for the common welfare again. America grew up that way. Only in the past few years has this class discrimination been fostered. It is time everyone takes off the tie to be just an American, as Admiral Nimitz gives such good example.

IT is an easier task to convert from peace to war than from war to peace. With the coming of war a sort of totalitarianism is asserted. The government tells each business what it is to contribute to the war program—just what it is to make and where it is to get the stuff out of which to make it. The planning and execution rest upon one over-all purpose and a single control. Patriotism exercises a strong compulsion. With peace, the opposite becomes true. Each has the right to make what he pleases. Governmental direction and aid disappear. The markets become free and each individual is dependent upon his vision, his courage, his resourcefulness and his energy. Everyone has the privilege of building up, but no one has the right to pull down. That is democracy at its best. In the reconversion and readjustment will come improvements in our standards of life—better houses, better clothes, better food, better safeguards for children, better health protection and wider educational opportunities. These bring hope for the future instead of fear; they give security instead of unrest.—Bernard M. Baruch, advisory unit for war and postwar adjustment policies, OWM.

Meetings Held in Northwest

Engineering and operating men, personnel directors confer in March. Postwar problems also talked

WITH one day on postwar planning and another day on timely current topics, the Engineering and Operation Section, Northwest Electric Light & Power Assn. held its annual round-table conference in Portland, March 23 and 24. Personnel directors and managers of member companies also met in conference in Portland in March. Following are some of the conclusions reached.

Engineering, Operation

HARRY M. JONES, Idaho Power Co., chairman, conducted the Engineering and Operation Section meeting, with assistance of discussion leaders for each subject. This method was adopted a year ago as a wartime measure. Utility engineers and operating men and manufacturers and jobbers representatives attended to the number 90.

At the session on postwar planning, Paul B. McKee, president, Pacific Power & Light Co., told the group that engineers working in American industry had more to do with waging war successfully than any other class of people outside our fighting men. He cited from first-hand knowledge the natural rubber program and the securing of mica and quartz from South America as examples of the enterprise and ingenuity of engineers in meeting a critical situation. He commended postwar planning, saying that after we have fulfilled our obligations toward doing everything we can for the war, we ought to try to devote an extra hour and an extra ounce of energy to postwar problems. He told of the recent meeting in Atlantic City of representatives of labor, industry, agriculture and other interests, where agreement had been reached on fundamental principles under which these groups could cooperate to build a better America after the war. "I am optimistic as to the future," he said, "when American scientific technique, enterprise and ingenuity will be applied to producing a greater prosperity than we have known in the past. We will need to extend help to other countries who need our technique, our money, our energy and our enterprise."

Patrick Johnson, vice-president, Puget Sound Power & Light Co., outlined the manner in which the association is organizing its postwar planning under the newly formed Electrical Development committee, of which he is chairman. It is difficult to differentiate between planning for war and planning for postwar, he stated, so it is our intention to plan "from here on out." All companies are undertaking planning programs, and it will be the purpose of the new committee to encourage this and to coordinate company planning by the gathering and transmittal of information and data useful to the companies, largely through the already organized sections of the association — engineering, accounting, utilization, and the newly organized personnel group consisting of personnel managers and directors of member companies.

The postwar planning session, presided over by O. L. LeFever, Northwestern Electric Co., as discussion leader, discussed plans for providing for increased or shifting load, the rehabilitation of worn out and obsolete equipment, and new procedures in operations. Some of the conclusions reached were: release of pent-up purchasing power, shifting populations, changes in working habits and new loads and devices will mean a shifting of load and a change in peak characteristics which must be anticipated as far as possible by surveys; obsolescence will be taken care of by a more general replacement of equipment rather than repairing the old, to take advantage of improvements in the art; the trend to automatic unattended stations where major replacements are required is a long-range program and should be deferred until after the critical transition period, when returning veterans will have to be placed in commerce and industry; dispatching will be improved by modern communication facilities of carrier and radio; quality of service standards will be kept high and will be improved; customers service departments will probably be expanded to take care of service on new devices that may not be adequately handled by existing service organizations.

Anticipating that many new men will be coming into the industry after the war, some companies are reviewing their accident records and preparing for a stepped up safety program. The adoption and publishing of safety rules, highlighting the principal points, has been tried, since it was found that the men would not read the whole state law governing safe working conditions. It was pointed out that accident prevention is a part of operation and the problem cannot be solved by appointing a safety engineer and setting off accident prevention work by itself.

A review of the operation of the Northwest Power Pool, under George C. Sears, Puget Sound Power & Light Co., discussion leader, revealed that the pool was functioning smoothly and effectively largely through the spirit of cooperation evidenced by pool members, consisting of eight private companies, the municipal systems of Seattle and Tacoma and the Bonneville Power Administration. Several advantages in the saving of critical fuel and in furnishing break-down service were cited. Addition of telemtering and load control equipment in the past year has aided pool operation but more of this equipment still needs to be installed, it was pointed out. Preliminary snow surveys indicate a less than normal stream flow for 1944, though precipitation from this point on will determine whether the critical water year of 1936-37 will be approached or not. Delegates desiring a comprehensive understanding of the physical makeup and operation of this pool—possibly the largest territorially (covering five large states) and probably the most complex (19 interconnections, with loops within loops) in the United States—were cited by the chairman to two articles recently off the press: *Electrical World*, March 4, 1944; and ELECTRICAL WEST, March, 1944.

Renewed interest in farm electrification was evidenced now that construction restrictions have been modified. Paul P. Ashworth, Telluride Power Co., leading this discussion, brought forth the fact that some companies are reviewing their extension policies with the idea of liberalizing them, and that all companies are interested in reducing line costs. A survey of present construction practices among member companies was recommended with a view to producing data that might form the basis for some modification of specifications.

In a discussion of the manpower situation, with C. P. Osborne, Portland General Electric Co., discussion leader, it was revealed that a greater degree of stabilization had been noted in recent months, though the stiffening of selective service to meet the needs of the armed forces in the immediate future is expectd to cause some difficulty. Companies operating on replacement schedules had found this system to be advantageous. One company had increased its employment of women from a prewar 200 to a present 550, mostly in offices, though with a few in

meter reading and as clerks in plants and stations. One small company has tried women hydro plant operators with some success.

Under this subject, A. M. McLean, formerly of the Vocational Training Department of Portland Public Schools, now of the local WPB, told of the apprenticeship school operated in Oregon under state law with a state council and local and sub-councils made up of employees and representatives of labor. The school was planned and directed by industry, according to McLean, about two-thirds of the work being taught on the job with one-third in the public schools. It was pointed out that this was a long-range program because of the present dearth of young men available for such training.

A need for cooperation between engineering and accounting departments was found in the matter of determining the proper charge for construction work as between property and maintenance. R. J. Davidson, Pacific Power & Light Co., discussion leader, invited T. W. Fryou, Portland General Electric Co., chairman of the association's Accounting & Business Practice Section, to be present with some of his section members to discuss this point. It was agreed generally when all the facts about a job were known, such as only the engineers could furnish, the determination of the proper charge could be made, except in a few borderline cases offering opportunity for difference of opinion. The Accounting Section has set up a committee to treat such borderline cases, and expects to make opinions available to all member companies with a view to securing a measure of uniformity in treating such jobs. In view of changed conditions as to earnings now prevalent, it was agreed that companies should review previous practices and would be justified in revising them if the revisions followed sound accounting procedure.

Personnel

PERSONNEL directors and managers of member companies of the Northwest Electric Light & Power Assn. were brought together into a conference in Portland, in the middle of March. This conference, which lasted a day and a half, is the first of its kind ever held by the association and was motivated by the thought that personnel problems have been acute during the war and promise to continue so well into the future. Six utility companies were represented at the first conference, which considered a wide range of personnel, manpower and training questions. C. W. Sherman, acting personnel officer of the Puget Sound Power & Light Co., Seattle, was elected chairman.

A feature of the conference was a joint session with representatives of the Selective Service System, the War Manpower Commission and the United States Employment Service. Major Frederick J. Brennan represented the Oregon State Selective Service office from Salem. G. L. Harding, labor utilization chief, and A. G. Johnson, training chief, of the War Manpower Commission, Portland; and J. R. Smurthwaite, Jr., veterans representative of the United States Employment Service, WMC, attended to represent their respective organizations.

Major Brennan told of the problems facing Selective Service in the immediate future, stating that no deferment could be expected on anyone under 26 years of age. The age limit used to be 22. Some 4-F's are being reclassified, chiefly in cases where their trouble is curable by operation or treatment. Smurthwaite pleaded that employers be sympathetic with the problem of the returned veteran who has seen action. It may take some time to stabilize these men, he stated.

Apprenticeship training and training within industry has been responsible for cutting absenteeism and turn-over in the firms where these had been tried, Johnson told the group, while Harding stated that the leveling process in manpower stabilization in the Pacific Northwest had started. Some contracts have been terminated, he said, and the WMC is now attempting to have Portland's classification changed from No. 1 critical to No. 2 or 3, so as to help stabilize the labor situation and bring in new contracts.

In the round-table discussion preceding the joint meeting with the government representatives, a number of pertinent subjects were aired and the following are some conclusions reached. Those who have filed replacement schedules found this system to be quite satisfactory. Few deferments had been asked, and it was pointed out that deferment cases should not be appealed unless the case was strong enough to carry clear to the president.

Most companies were operating on a temporary basis for duration employes, though expected to keep some of these permanently. Many companies were considering new pension plans. All had some form of sick leave compensation, medical aid and hospitalization plan in operation.

Union agreements and their interpretations were discussed at length. Most of the companies had used the "training within industry" program and had found it useful in training new employees. Few of the companies carry their accident prevention programs on under their personnel departments. There was a general discussion of the desirability of setting up a close control of manpower and personnel problems of a company through a centralized personnel office.

In a discussion of the postwar era, there was agreement that the companies had a strong moral obligation as well as a legal one toward returning service men. Training will be particularly important in this era, and the thought was expressed that a comparatively new field might be opened up in the training and upgrading of supervisors.

Important studies for the future were outlined, and committees were appointed by the chairman to report at the next conference, which may be held in the fall of the year.

Postwar Planning

POSTWAR planning in the Northwest Electric Light & Power Assn. will be activated through the newly formed electrical development committee, according to J. A. Hale, vice-president, Utah Power & Light Co., president of the association. In announcing the appointment of Patrick Johnson, vice-president, Puget Sound Power & Light Co., as chairman of this committee, Hale points out that postwar problems in an all-round planning program are difficult to differentiate from problems arising now that may be carried over into the postwar period, hence the committee should concern itself with planning "from here on out."

This committee can encourage company planning, can undertake survey and research projects to aid member companies in their planning, and can encourage united action or policy in matters where a measure of uniformity seems desirable.

Johnson, in announcing the appointment of the committee, pointed out that all companies are undertaking planning programs along functional lines, therefore it has been deemed desirable to set up the association planning along lines of organization, with the chairman of each section and the chairman of each section's planning committee, and other representatives as committee members. The committee will be kept small for effective work, said Johnson. Its chief function will be to direct and coordinate what planning is undertaken, and to farm out most of the work to sub-committees in each section.

The following have been appointed members of the committee with the idea that other representation may be added as the need arises: Harry M. Jones, Idaho Power Co., chairman of the Engineering & Operations Section; O. L. LeFever, Northwestern Electric Co., chairman of the Engineering Section's planning committee; Charles E.

Hess, Puget Sound Power & Light Co., chairman of the Utilization Section; D. B. Leonard, Pacific Power & Light Co., chairman of the Utilization Section's planning committee; T. W. Fryou, Portland General Electric Co., chairman of the Accounting & Business Practice Section; E. W. Bredemeier, Portland General Electric Co., chairman of the Accounting Section's planning committee; Ross B. McElroy, the Washington Water Power Co., chairman of the Membership Committee of the Utilization Section; C. W. Sherman, Puget Sound Power & Light Co., chairman of the newly formed Personnel Conference of the association; L. R. Wilson, Lamp department G-E Co., representing the manufacturers; and Harry A. Dunlap, Westinghouse Electric Supply Co., representing the distributors.

The ground work for specific planning projects was laid by a meeting of the committee in Portland, March 22. The committee proposes also to exchange information and data with other industry groups engaged in similar work: Edison Electric Institute, Pacific Coast Electrical Assn., Rocky Mountain Electrical League and others.

Underwriters' Celebrates

Combining a celebration of the 50th anniversary of Underwriters' Laboratories and a meeting of the Northern California Chapter, International Association of Electrical Inspectors, 125 electrical men in all branches of the industry gathered at Underwriters' Laboratory, San Francisco, 500 Sansome St., the evening of March 15. Underwriters' staff, headed by H. G. Dodge, senior electrical engineer, and assisted by J. W. Cannon, H. E. Baker, F. J. Ryno and L. R. Givens, presented the first part of the program.

Before the actual tests were made, the visitors were shown replicas of the initial laboratory's equipment in San Francisco in the days of the original laboratory. (See ELECTRICAL WEST, March 1944, p. 66). Likewise, a rain test was shown in operation, a rain-tight type of externally operated switch being tested. Display boards showing good and bad wiring practices and results of failures also were on display and a demonstration was made of the oscillograph used to determine wave forms.

Then the group was broken up into smaller groups, each of which in turn was shown the following demonstrations of tests: Oil burners, air heaters, calculating machines and some of the war substitute fluorescent fixtures.

After these demonstrations the Northern California Chapter meeting was held. H. C. Romick, department of electricity, San Francisco, newly elected chairman of the chapter, was introduced by Secretary-Treasurer H. L. Gerber, re-elected, and Romick presided over the discussion session. M. C. Sandles, electrical department, Oakland, was elected vice-chairman.

Main topic of the evening was emergency types of wire and the places specifically listed and conditions prescribed for their use. Harold L. Gerber, chief inspector, department of electricity, San Francisco, led this discussion demonstrating various types of bare neutral non-metallic sheathed cable, emergency insulated wire and synthetic wire. It was made plain that the emergency insulation was to be used only on exposed knob and tube wiring or could be used as the neutral wire or grounding wire where it carries no current. It is not to be used, he said, for switch legs since both legs of a switch leg carry current. Where such wire enters a panel it is to be grounded to it and the wire is not to be used except with plastic or porcelain outlet boxes. Reason for this was explained in the possibility of stray currents finding shorter paths to ground, the old objection to bare neutral wiring.

Romick announced that it was his intention to hold meetings every two months. The group voted for the next meeting in San Francisco at PG and E Auditorium approximately two months from March 15. A committee consisting of Clifford Prudhomme, M. C. Sandles, Nick Siggins and Joseph McTighe was assigned to bring to that meeting inspectors' problems for discussion.

Long Heads Group

Scenically called a "Latin-American Revolution" but in reality no more than a thoroughly orthodox change of administration in perfectly prescribed fashion, the meeting of March 6 of the Electric Club of San Francisco saw the inauguration of E. A. Long, Pacific Gas and Electric Co., public relations department, as president, succeeding I. W. Borda, Okonite Co., to Mexican musical accompaniment and an untranslatable Spanish oration and presentation by George C. Tenney, Frank Angle, past president, engineered the change-over.

Elected with Long as new directors were Freeman Scharr, Bryant Electric Co.; Frank Sherwood, Pacific Gas and Electric Co., and M. L. Woodard, manufacturers' agent. Holdover directors from the past administration remain Charles Huyck, Graybar Electric; Al Meyer, Leo J. Meyberg Co., and William A. Cyr, ELECTRICAL WEST. Clark Baker, Northern California Electrical Bureau, was re-elected secretary.

President Long announced the appointment of the following committee chairmen: Charles Huyck *News Sparks* editor; Willis Winter, Westinghouse Electric & Mfg., attendance; Herbert Atwater, membership; Freeman Scharr, program; John Corlett, General Electric Co., publicity; D. E. Harris, public policy and Joseph Gumz, Pacific Gas and Electric Co., reception.

IAEI Holding Meetings

Printing delays being as they are three chapter meetings of the International Association of Electrical Inspectors in the Rocky Mountain region will be being held as this issue reaches readers. These meetings are the Rocky Mountain Chapter, meeting in Denver, April 10 and 11, the Utah Chapter meeting in Salt Lake City, April 12 and the Montana Chapter meeting at Great Falls, Mont., April 14 and 15. In general a similar program will be presented at each of the meetings. Among the prominent speakers will be V. H. Tousley, executive secretary-treasurer, IAEI, of Chicago, Ill.; Samuel Rosch, head of research department, Anaconda Wire & Cable Co., New York; Austin Dunham, district manager of the same company, Denver; L. B. Johnson, district representative, General Electric Co., Salt Lake City; W. A. Cyr, associate editor, ELECTRICAL WEST. J. H. Stayner, president Northwestern Section, IAEI, of Salt Lake City, and F. D. Weber, secretary-treasurer of Portland, Ore., will likewise be present at the Utah and Montana meetings. Full report of the meetings will be made in the May issue.

● MODESTO has been selected by the Southwestern Section, International Association of Electrical Inspectors, as the place for its next annual meeting in September. Hotel Modesto will be the meeting headquarters and Harry C. Moore, city electrical inspector of Modesto, will have charge of local arrangements for the meeting. Availability of hotel accommodations, central location with reasonably easy access by trains or buses were the deciding factors in selection of Modesto. Nick Siggins, San Francisco electrical inspector, is president of the Southwestern Section and the meeting this year is due for the northern part of California.

Quarterly meeting of the Puget Sound Chapter, International Association of Electrical Inspectors, was held March 3 in Seattle at the 4088 Club. Following the dinner, code discussion was led by H. Hilpert and R. Geddis.

What an Association Means to You

Electrical Contractor president tells members need for bid depository and other protections

*George W. Abbett**
President, San Francisco Electrical Contractors Assn., Inc.

HOW many realize, I wonder, the meaning and value of our association activities and how we can organize them so that they will pay us the dividends we want?

There are three phases that stand out in our activities: First—protection from ourselves; second — protection from our awarding authority; third —protection from any individual or group which seeks to damage or destroy our industry.

I want to do a bit of reminiscing with you at this time. Perhaps in doing so, the memories that will be recalled will not be too happy, but will serve as an antidote for our future ails.

I would like to know how many men and their wives remember when we were bidding what we called a large job, the reaction and fear that we experienced. Of course, we all "know our business" and are the smartest individual in the game, but nevertheless, I am sure that the thing that was deepest in our minds was whether or not we would find ourselves out in the street after the bid opening. I know the feeling of nausea that comes at that time and, by observation of my competitors, they were experiencing the same trouble. I have seen them pale and then breathe a sigh of relief when they lost the job. The low bidder's main thought was to get away and see where the mistake had been made. Few men under strain can successfully conceal their feelings. I know the reaction and the concern of the little woman at home was the same, for her whole world dangled on that same thin string.

There has come to us during the past few years good fortune financially, but through the horror and misery of the world at war. I know there isn't a single one of us who would not return our financial gain for a world at peace. However, I hope we have learned a lesson. That we cannot do all the work and that we must divide our good fortune with others or lose it all.

Those of us who are fired with a little more ambition and fearlessness, should well know that the meekest member can completely spoil and take away our livelihood either by willfulness or ignorance. Therefore, it behooves us to educate our fellow members so that such conditions cannot exist. We should cement ourselves together in this association in a way that we will insure to all that God-given right to happiness and well being.

Our industry has done a fine job in setting up a fort for our protection against the awarding authority. The name of the fort is The Electrical Industry Depository of California. It is not a brain child of ours, but a resurrection of the best point of NRA.

This depository has accomplished wonders for us. It has given the electrical contractors a respected standing higher than any other craft of the construction industry, and has just about done away with the noted chiseler. It has put us in the position of being able to walk into the office of any awarding authority or general contractor and to transact business as businessmen. The practice of sneaking out the back door while our competitors crawled under the front to get a "look see" has completely vanished.

The Bill of Rights and the Constitution give us two very important rights; that of freedom of speech and the right to lawful assembly. Through our association, we are able to take advantage of this heritage and to protect ourselves. We must be on guard against destructive legislation and powerful, well-financed organizations seeking to further their own interests at the expense of others.

We well know that powerful, well-financed organizations descend upon our national and local governments and come home with the bacon.

The effectiveness and power of an organization is completely dependent upon two things, time and money. They must be given to the organization freely by each and every one of its members.

Extreme care must be used in the control of a trade organization by its officers to keep it from degeneration to an unlawful and destructive agency, thus defeating its very purpose.

Our association, organized and operated on the principles outlined, does not have to fear any individual or group, and becomes a necessity and asset to the nation.

I can see greater things ahead in the postwar period for us here in California, if we can regulate our business principles and learn to live and let live. Many plans have formed in the minds of our engineers and industrialists as to public and private construction and reconstruction of war plants. How soon this work will start up, and just how bad the drop will be during this reconstruction period, I cannot hazard a guess at this time. I strongly advise each of you to make definite plans now and to conserve your assets to carry you through this transition.

Financing is another important phase of our association activities. It is my solemn belief that next to the sincerity of our members, a full treasury is our biggest asset. Each member has an equal share in the assets of our association, and I want him to feel that way about it, get in and take his share of the work. This will be necessary to continue our success.

In summing up our problems, I feel that they can be handled very simply and well by each of us adopting the principle of sincerity and charity in our dealings with other members and with the Industry as a whole.

* Presented at the annual dinner of the association, San Francisco, in February.

Utah League Directors

In addition to the officers recently announced as elected for the Electrical League of Utah (see ELECTRICAL WEST, February 1944, p. 100), a list of the directors chosen representing the various branches of the industry in Utah has also been announced by Frank Bodine, Westinghouse Electric & Mfg. Co., president of the league. These directors are as follows: *Wholesalers*, W. O. Smith, General Electric Supply Corp.; George Rogers, Strevell-Paterson Hardware Co.; Roy Kimberlin, Graybar Electric Co. and Leland B. Flint, past president. *Contractors*, Harry Hall, Capitol Electric Co.; Jack Jacobs, Apex Electric Co.; Robert Tschaggeny, Artistic Lighting Studios and Kimball Vance. *Manufacturers*, Bert Rowley, Edison General Electric Appliance Co.; Walter G. Wood, American Steel & Wire Co.; L. B. Johnson, General Electric Co. and Frank Bodine, Westinghouse, president of the league. *Dealers*, J. Vernon Sharp, Sharp Electric Co.; Wayne Stillman, Radio Studios; Kenneth Smith, Kenneth E. Smith Co. and Ernest Gillespie, Sears, Roebuck & Co. *Utilities*, W. A. Huckins and C. A. Wolfrom, Utah Power & Light Co.; Ora Barlow, Mountain States Telephone & Telegraph Co. and J. F. McAllister, Utah Power & Light, secretary treasurer. George Nelson is league manager.

Two films, one on television, the other on frequency modulation, were shown at the March 22 meeting of the Southern California Chapter, IAEI, both arranged for by General Electric Co.

PCEA Panorama

Edited by Mary Shoop

Tentative Program

Announced for two spring meetings

PCEA spring conferences will be held on Wednesday, May 10, in San Francisco at the Fairmont Hotel, and on Tuesday, May 16, in Los Angeles at the Ambassador Hotel.

Much in the way of assistance on problems of the wartime present and the postwar future will be offered to PCEA members at the conferences. The programs developed by the three guidance committees make use of every moment for the presentation of pertinent and valuable information.

They were drawn up under the direction of P. P. Pine, San Diego Gas and Electric Co., chairman of the Business Development Section; E. A. Crellin, Pacific Gas and Electric Co., chairman of the Operating Economics Section, and F. C. McLaughlin, Southern California Edison Co., chairman of the Administrative Services Section.

PCEA President Frank Angle, Allis-Chalmers Mfg. Co., will preside at both the Los Angeles and San Francisco conferences.

Highlights of the probable program will be:

1. In the Administrative Services Section, a discussion of personnel problems, with emphasis upon plans for the re-employment of men and women returning from military service, with consideration of special training they may have received or special qualifications they may have developed while serving their country.

2. In the Business Development Section, a discussion of postwar distribution channels designed to convey to the dealer the realization that he has a definite place in all plans now under consideration.

3. In the Operating Economics Section, a discussion of population trends and their effect upon postwar power distribution problems.

4. A demonstration of the latest laboratory developments in lighting, presented by Samuel G. Hibben, director of applied lighting, Westinghouse Electric and Mfg. Co., Bloomfield, N. J.

A detailed program of the conferences is being mailed to each PCEA member. Each section will meet separately as a unit and there will be plenty of opportunity for general discussion.

The annual meeting of the association will be combined with the San Francisco meeting. It will include election of officers for the new administrative year, including president and nine directors to succeed those whose terms will expire.

Who Am I?

I was born in Providence, R. I., a long time ago. My early education began in the Rhode Island schools and was completed in the Pasadena schools. I attended Stanford University and was graduated with an AB degree in 1907. Who am I?

I entered the employ of the Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa., works in September, 1907, as a graduate student, specializing on electric railway equipment. I was transferred to the Los Angeles sales office in 1910. After serving as San Diego representative from 1912 to 1913, I returned to Los Angeles as sales representative for all lines of products, later specializing on central station apparatus. In 1923 I was placed in charge of central station activities, and am now supervisor of the central station and transportation division, Los Angeles. Who am I?

I am a member of the Los Angeles University Club, Electric Club, Town Hall, American Institute of Electrical Engineers, and Pacific Coast Electrical Assn. I am a director of PCEA, a past president of the Electric Club and a past chairman of the Los Angeles Chapter of AIEE. My hobbies are golf, fishing, music and economics, and my name is:

See page 108.

● PCEA's widening influence among electrical men in the service is indicated in a letter from Chief Electrician's Mate Robert Spence, formerly with PG and E., San Francisco, now on active duty with a "c/o Fleet Post Office, San Francisco" address.

"I wish to be carried on the PCEA service membership list and enclose $1 for a subscription to ELECTRICAL WEST. Many of the men working with me enjoy receiving news of the electrical industry at home, and you may be sure we will pass it on to still others in the same field."

More Home Planning

SUCCESS that is attending the initial Home Planners' Institute at Pomona, Calif., which ends May 9, was the inspiration for a number of others which are now in session. Institutes started March 21 in Fullerton, March 23 in Santa Ana, March 30 at Anaheim and April 4 in Santa Barbara.

Five Home Planners' Institutes in Los Angeles serve residents of various parts of the city. One series of meetings opened April 10 at Audubon Junior High School for the benefit of people in the western area, another April 11 at Huntington Park High School for southeast residents, April 12 at Roosevelt High School for dwellers in the eastern part of the city, April 13 at Polytechnic High School for the central area, and April 14 at Van Nuys High School for the San Fernando Valley.

Plans are under way also to hold an institute at Inglewood.

This movement is sponsored by a number of organizations representing various homebuilding industries, with PCEA representing the electrical industry, and is held under the auspices of the adult education department of local schools. In addition, the plan has been endorsed by E. M. Evans, chief of the division of adult and continuation education, State of California, who has issued two bulletins to schools in the state publicizing the activity.

A 10-week standardized program covers all phases of building a home. One meeting, consisting of two lectures, is held each week. The electrical requirements of a modern home in adequate wiring, lighting and garden illumination are presented fully to enrollees during the course.

Qualified speakers for the program are provided by a centralized speakers committee staffed by Walter Hagedohm, public relations chairman, State Association of California Architects; Neill Davis, executive vice-president of the Building and Loan League, and V. W. Hartley, managing director of PCEA.

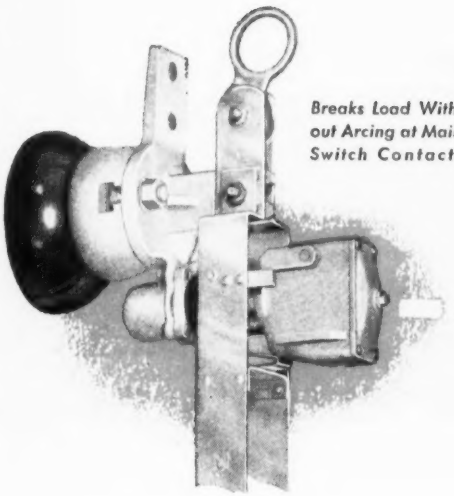
This committee arranges that each speaker represents his industry rather than his company. For example, the speaker on heating and insulation represents the American Society of Heating and Ventilating Engineers, the speaker on plumbing the Master Plumbers Assn., and the speaker on electrical subjects, PCEA.

Great interest is universal in the Home Planners' Institutes.

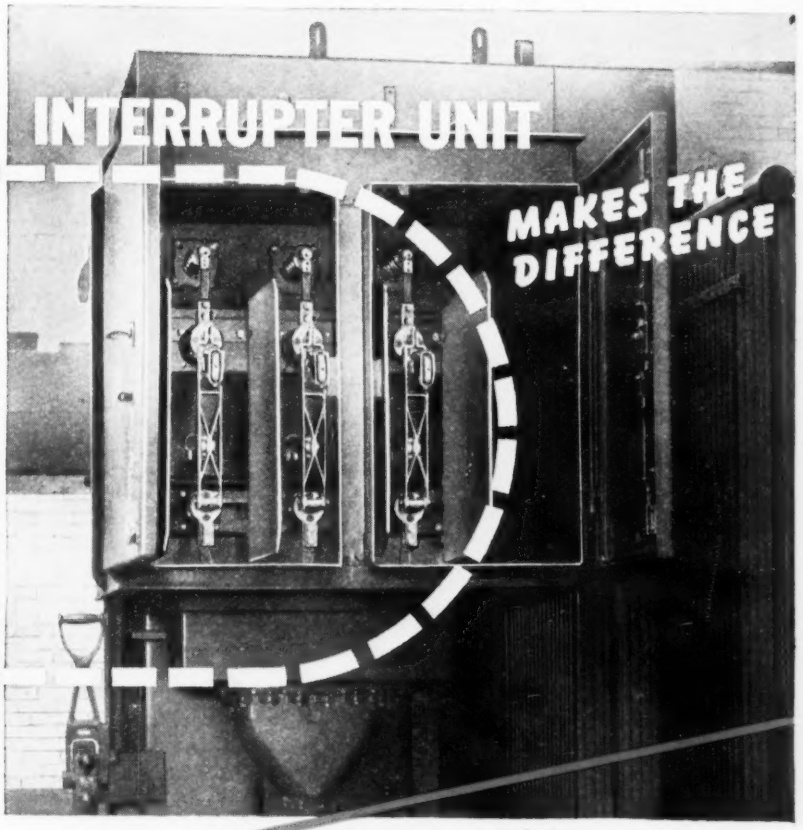
THIS MODERN LOAD-SWITCHING

Saves Space, Installation, Operating and Maintenance Costs

THE S&C INTERRUPTER UNIT MAKES THE DIFFERENCE



Breaks Load Without Arcing at Main Switch Contacts



These S&C Load Interrupter Disconnects were applied for interrupting the magnetizing current of a 1000 KVA, 13.8 KV, 3-phase transformer, and for emergency switching under full-load conditions. They were chosen on performance records of these switches as proved in hundreds of representative utility and industrial installations—chosen because of definite savings and overall reliability.

Get the facts about these and other savings on your new installations where safe, dependable load switching is required. Write for Bulletin 202-A.

★ ★ ★

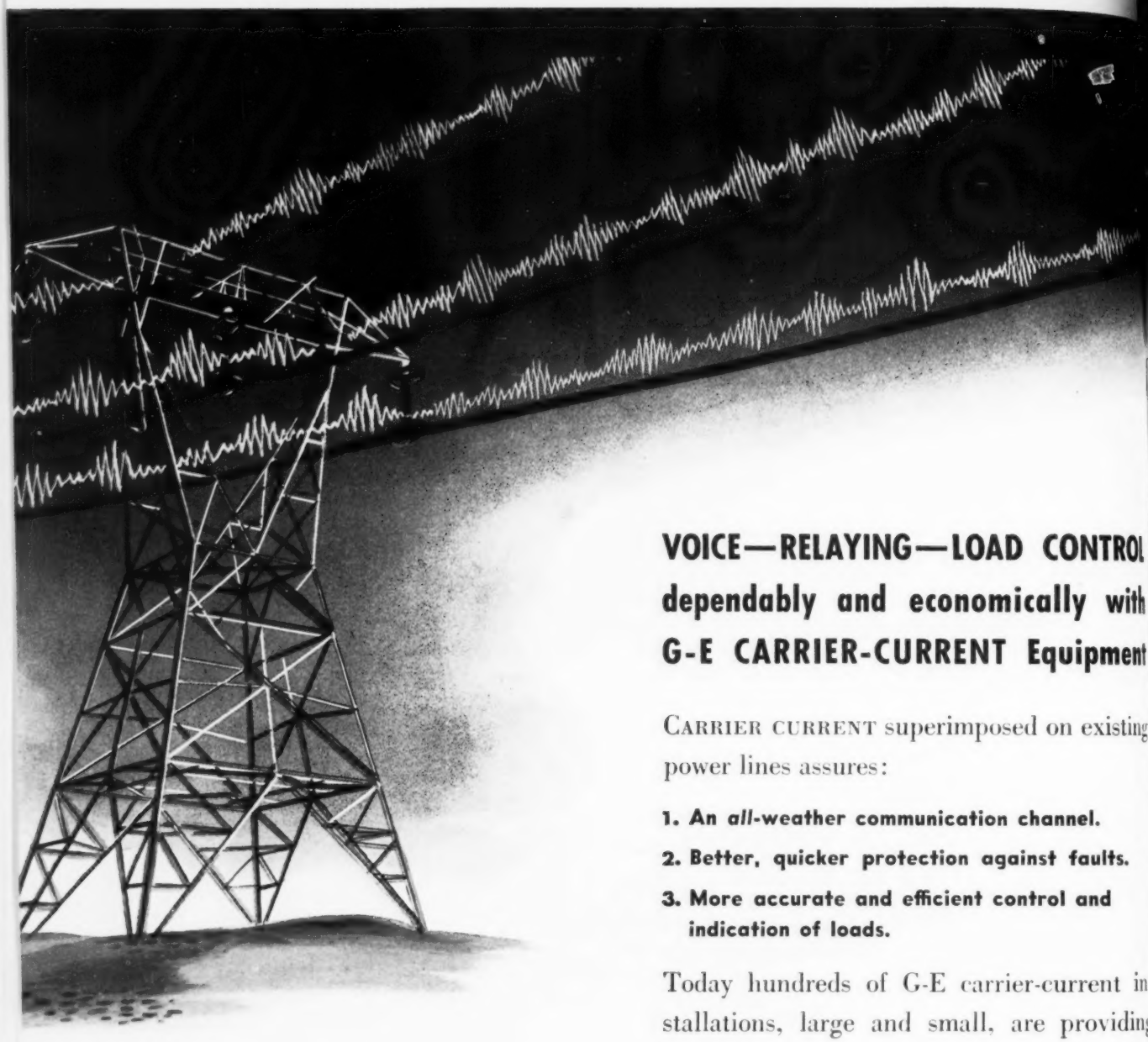
S&C Load Interrupter Switches and Power Fuse combinations also have found wide application in: sectionalizing feeder circuits under load, emergency load-switching of sub-station transformers, isolating feeder taps and capacitor banks.

SCHWEITZER & CONRAD, INC.
4435 Ravenswood Ave., Chicago 40
Supplied in Canada through Powerlite Devices, Ltd., Toronto, Ontario

LOAD INTERRUPTER DISCONNECT

WITH S&C INTERRUPTER UNIT

YOUR BEST SIGNAL CIRCUI
IS THE POWER LINE ITSEL



VOICE—RELAYING—LOAD CONTROL dependably and economically with G-E CARRIER-CURRENT Equipment

CARRIER CURRENT superimposed on existing power lines assures:

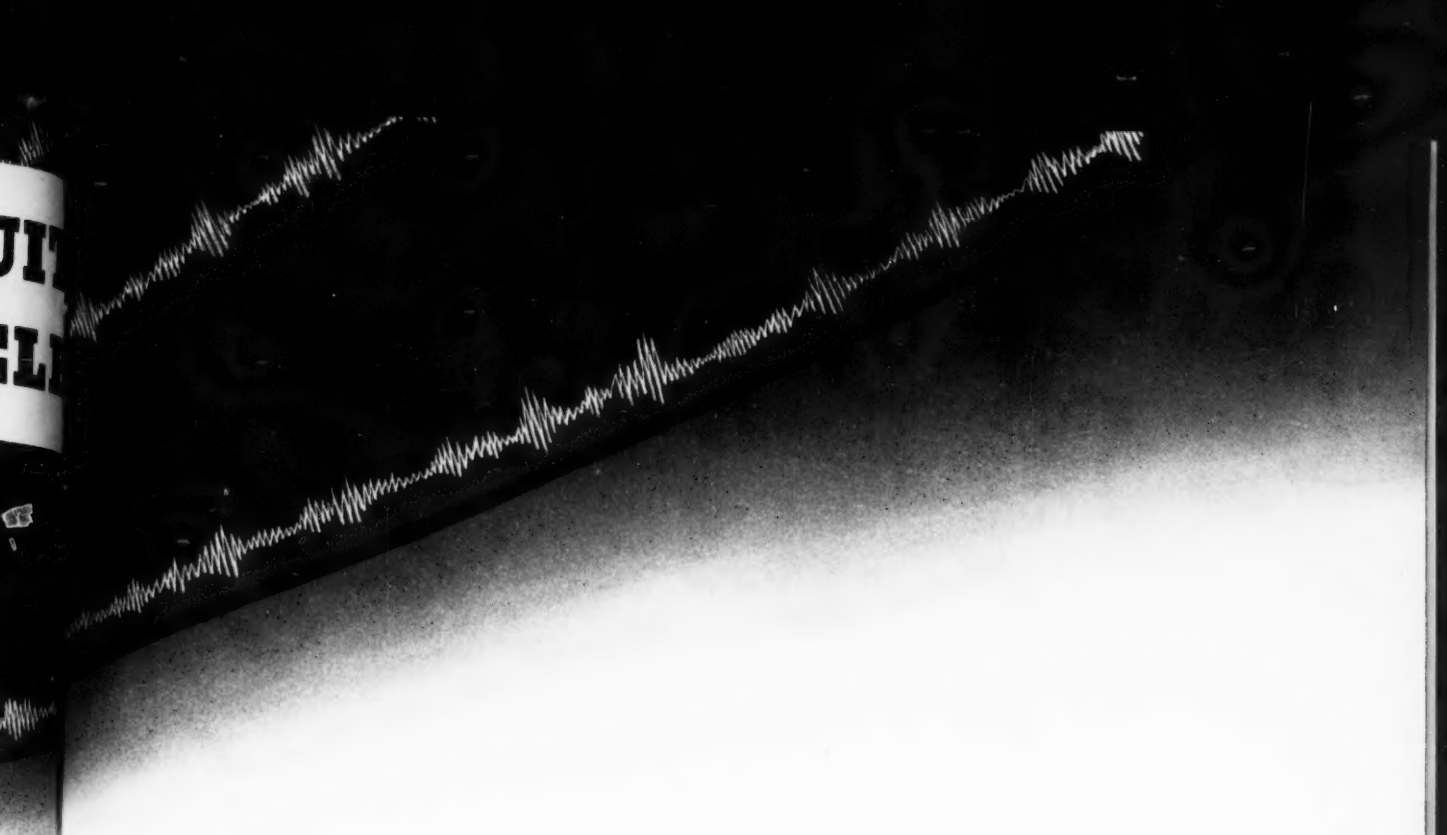
1. **An *all*-weather communication channel.**
2. **Better, quicker protection against faults.**
3. **More accurate and efficient control and indication of loads.**

Today hundreds of G-E carrier-current installations, large and small, are providing the above and other advantages for power companies throughout the nation.

Pilot Relaying. Transferred Tripping. Signaling. Telephony. Telemetering. Super-

GENERAL ELECTRIC

151-87



visory Control. Automatic Load Control. Line Sectionalizing Control. . . . Singly, in pairs, or in multiple combinations, these and other carrier functions may be installed to best fit the needs of your system.

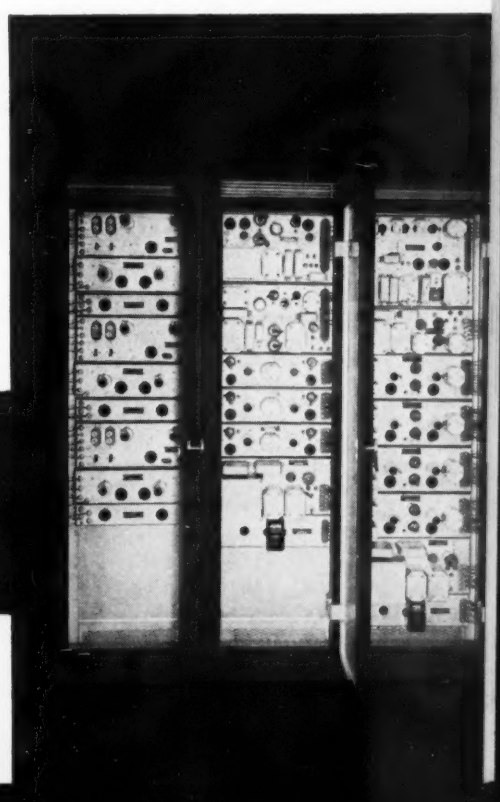
G-E standardized panel-unit assemblies permit step-by-step additions to original installations. Compactly "packaged," carefully built, thoroughly proved, they are capable of performing many functions through few carrier channels—all over one transmission system.

With the highest manufacturing standards, and the know-how of 20 years of research and development, G. E. offers the surest control facilities for better power service to the community.

General Electric engineers are prepared to discuss your needs—TODAY. . . . *General Electric, Schenectady, New York.*

• ***Tune in*** **"The World Today"** ***every evening except Sunday at 6:45 E.W.T. over CBS. On Sunday listen to the G-E*** **"All Girl Orchestra"** ***at 10 P.M. E.W.T. over NBC.***

★ BACK THE ATTACK—BUY WAR BONDS! ★



GENERAL ELECTRIC HAS PLANNED AND BUILT MORE CARRIER-CURRENT EQUIPMENT THAN ALL OTHER MANUFACTURERS COMBINED

CARRIER CURRENT

THE NERVE NETWORK OF THE POWER SYSTEM

NEWS of the industry

COMBINE OFFERS $90,000,000 FOR PUGET SOUND SYSTEM

Through their joint agent, Dr. Paul J. Raver, Bonneville administrator, 16 Washington PUDs, the City of Seattle and Bonneville on March 21 made an offer of $90,000,000 for all properties of Puget Sound Power & Light Co. Included in the total is the $33,000,000 recently bid for distribution facilities by the PUD combine.

If the company accepts the offer, it must then be submitted to three government agencies—the U. S. Congress, the City of Seattle and the PUDs.

Although Seattle's share was not outlined specifically, it was generally understood that the city would pay $27,000,000. City officials have stated that a public election will precede purchase.

According to the recommendation, the federal government would buy the remaining generating and transmission facilities for $30,000,000. Acquisition by the government of the company's Rock Island dam and power plant on the Columbia River is included in the plan.

Raver indicated that Bonneville participation had been approved by Interior Secretary Harold L. Ickes, although it is subject to congressional approval and appropriation.

Evaluations of Puget Sound's generation, transmission and distribution properties have been made by the Chicago firm of J. Samuel Hart and engineers of Seattle City Light and the Bonneville Administration.

In his letter submitting the offer, Raver stated:

"I feel this offer merits your serious consideration. A solution of this problem is not only of primary importance to the security holders of the Puget Sound Power & Light Co. and the principal for whom I am acting, but is one which affects the economic development of the Puget Sound region."

He then pointed out that the $90,000,000 price, if accepted, together with other assets of the company, should enable the company to retire its bonds at call price the preferred stock at its par of $100 a share and new common stock recently issued at its full par value of $10 a share. He also believes it would provide for the establishment of a fund by the company for the protection of the rights of employees which have accrued under the company's pension and retirement plan.

In a statement issued from New York, Frank McLaughlin, Puget Sound president, stated that company directors would confer upon the matter following his return to Seattle, but indicated that, under present circumstances, the offer could not be regarded as a qualified bid.

McLaughlin's statement said in part:

"I cannot see that the Bonneville Administrator's letter constitutes a firm bid with cash available for the acquisition of the company's electric properties. On the contrary, it appears to be a mere exploration of the receptivity of the company to a firm bid when and if one can be produced at some indefinite time in the future.

"The letter indicates that all the Bonneville Administrator is empowered to do is to talk and even if a satisfactory price were agreed upon, he cannot commit the PUD's the City of Seatttle and Congress. But the approval of all these bodies must be obtained before a sale can be effected.

"Consequently proof of legal power to acquire the properties and tangible evidence of ability to finance such acquisition are not given in the letter. As stated by the company's board of directors in 1943 and previous reports to the stockholders, these are prerequisites to the consideration of a sale."

Short-Term Contract Signed For Fort Peck Power

A short-term contract for sale of electric energy generated at Montana's Fort Peck project to the Montana Power Co. was approved by the Federal Power Commission in March. Schedules for long-term rates are being studied by the Bureau of Reclamation for submission to FPC.

Under the interim contract, Montana Power Co. will pay 2½ mills per kilowatt-hour for the energy and $30,000 annually for use of government facilities for assuring continuity of service and regulation at delivery points. In the event that energy charges exceed $220,000 per year, the charge for facilities will be remitted.

The government has been supplying the power company with energy from the Fort Peck project since July 1, 1943.

Commission Will Survey Columbia Power Resources

An international joint commission will undertake a broad survey of the water power resources of the Columbia River and its tributaries at the request of the Canadian and United States governments, it was announced recently by Canadian Prime Minister MacKenzie King.

Recommendation will be made by the commission on how the resources of the river system, which drains a large portion of southern British Columbia and four states, may be developed to give maximum service to people on both sides of the border. Both Canadian and American engineers and economic experts will work on the study.

CITY MAY BE YARDSTICK FOR COST DISTIBUTION

Possibility that the City of Redding, Calif., may be a proving ground for a regulation requiring municipalities purchasing Shasta Dam power to distribute it at cost was seen in an offer last month to give the city a guaranteed top rate of five mills per kilowatt-hour. The offer was made at a large public meeting by USBR Regional Director Charles E. Carey, who has been carrying on negotiations with the Redding city council.

Carey's offer is 2½ mills cheaper than the price Redding is now paying to Pacific Gas and Electric Co. for power which it distributes to the city.

Outlining his negotiations with the Redding city council, Carey said he had proposed that the city resell Shasta Dam power on the basis of "service to the ultimate consumer at the lowest possible cost" and on a non-profit basis.

Carey told his audience that in proposing power-at-cost distribution he was following the policy of the Department of the Interior and Bureau of Reclamation for making the public the beneficiaries of the development of Western water resources.

The lowest rate for Shasta power probably would be 3.8 mills, the rate at which the PG and E has contracted to buy it, Carey stated. He offered to write a contract immediately at five mills with the stipulation that Redding would be given the benefit of any lower rate which may be offered later to any other city.

Questioned as to the ability of the Bureau of Reclamation to provide adequate standby service, Carey said the war-duration contract with the PG and E for the delivery of Shasta power into company lines clearly provides for service to bureau customers.

● AFTER more than five years of litigation involving an appeal to the United States Supreme Court, the City of San Francisco recently emerged victorious in a $1,000,000 lawsuit brought by the Transbay Construction Co. as an aftermath to the construction of O'Shaughnessy dam of the Hetch Hetchy water and power project. Cause of action was the contention of the plaintiffs that while their original contract called for the excavation of 30,000 cu. yds. of earth in providing anchorages for the dam, they actually excavated 84,000 cu. yds. when it was decided to raise the dam 35 ft. above the original level.

HUBBARD PEIRCE SECONDARY RACKS SUPPORT THE LINES

THAT LIGHT THE LAMPS OF CHINA

Even in far-off China, Hubbard Pole Line Hardware is being employed to fill the exacting requirements of electrical power transmission and distribution lines. In narrow streets where space is limited, as well as on spacious avenues where overhead lines must avoid unsightliness and the hazards of congestion, Hubbard Peirce Secondary Racks provide the logical solution. These racks have been soundly engineered for rugged strength. Their design provides sufficient space between points and insulators to avoid any possible jamming of the wires. Smooth rounded surfaces prevent injury to insulation during "pulling" operations. In line with the old Chinese proverb "One picture is worth a thousand words" the views above speak for themselves.

HUBBARD

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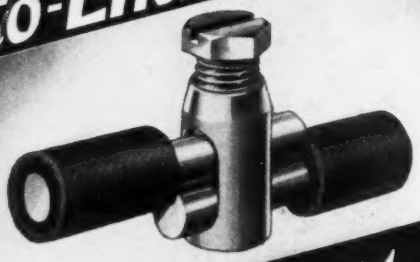
HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD

For any End-to-End Connection—



You Save Almost 50% with BLACKBURN "GRIPITS"

Yes, Blackburn "Gripits" are far more economical than split bolt connectors, at the house service entrance, or for connecting any two wires together, end to end, as illustrated. Made of high-strength copper alloy, actually stronger than steel. Circular construction gives extra strength along the line of pull of the screw. "Gripits" will not stretch or distort when tightened . . . will not come loose.

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LOS ANGELES WORKERS GET NEW PAY BOOST

Bringing employees of the Los Angeles Department of Water & Power to within $5 of the $15 monthly pay increase asked during their recent strike, a second wage boost was granted 3,400 workers last month. The $5 raise, which affects all department employees earning $350 a month or less, followed a like raise in February.

Threats of a second strike were dispelled in March, when a majority of the 5,759 employees voted against another walkout until Department Manager H. A. Van Norman and representatives of the IBEW had had an opportunity to work out a new wage scale. The increase was a temporary measure pending a final report to be submitted to the board of water and power commissioners by the three-man wage survey committee.

Work Resumed on Keswick Following Wage Dispute

Work on Keswick Dam in Shasta county, Calif., was resumed March 11 after a close down since Feb. 7. The AFL building trades council announced the back-to-work program following a promise of a wage adjustment board in Washington, D. C. that a hearing on the carpenters' union case would be held as soon as work was begun.

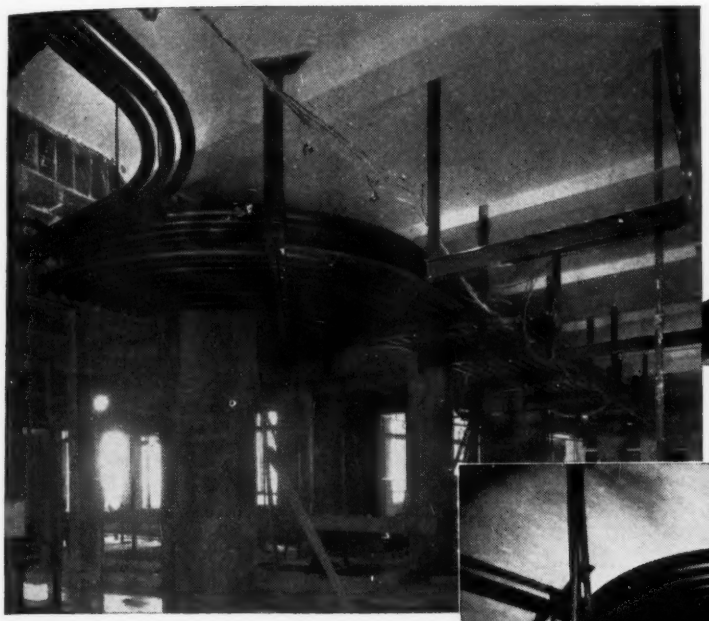
About 400 carpenters struck in defiance of the wage adjustment board's refusal to allow wage raises promised by Atkinson & Kier Co., builders of the dam, (prior to the wage freeze order) to go into effect after the order was issued.

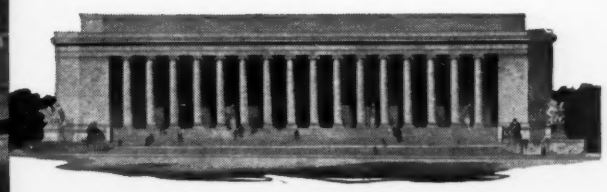
● Employees of the Coast Valleys division of Pacific Gas and Electric Co. will vote on the question of representation for collective bargaining by the AFL International Brotherhood of Electrical Workers. The election was ordered by the National Labor Relations Board on March 15. The utility contended that the division is not an appropriate bargaining unit. In a previous election employees had voted 18 to 18 on the question.

● The Twelfth Regional War Labor Board in Seattle recently took under consideration a wage increase demand of 20 members of the AFL Electrical Workers Union employed by Central Lincoln County PUD in Oregon which precipitated the first strike against a PUD in that state. About a score of workmen were involved in the strike which left 100 miles of power line without maintenance. Directors of the PUD agreed to a 7½% wage increase, subject to the approval of the regional WLB.

How Central Rigid Steel Conduit was used in Mellon Institute

Built for Eternity





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CALIFORNIA SCORES WATER TREATY WITH MEXICO

Vigorous objection to Senate ratification of the proposed water treaty between the United States and Mexico was voiced in California last month. The treaty would guarantee to Mexico for all time 1,500,000 acre-ft. annually of Colorado River water.

That California's political chieftains were in accord that the treaty should at least be modified was evident earlier, when Governor Earl Warren and Attorney General Robert Kenney announced their intentions of going to Washington to appear before the Senate Foreign Relations Committee.

Governor Warren in criticizing the proposed treaty, declared that it would mean that hundreds of thousands of rich acres in California and Arizona, which can be irrigated from the Colorado River, would be condemned to desert forever.

Both Warren and Kenny point out that the 1,500,000 acre ft. of water is double the amount this nation's sister republic used prior to the development of Boulder Dam.

In addition to doubling the amount of water from the Colorado which Mexico would be guaranteed under the new arrangement, whenever it was decided by a joint commission that there was a water surplus, an additional quantity up to 200,000 acre ft. a year would be provided.

Kenny further contends that under existing contracts which California has with the Secretary of the Interior, a total of 5,362,000 acre ft. of water per year has been allocated projects and communities in the state. Ratification of the treaty negotiated by the State Department, he declares, would mean a shortage in the water deliveries contracted for by the Department of Interior.

Arizona Body Passes Power Authority Act

Creation of a power authority with jurisdiction over energy allotted to the State of Arizona from Colorado River projects is provided in a bill passed at a special session of the state legislature and signed by Governor Sidney P. Osborn.

In signing the bill Gov. Osborn pointed out that, while the measure falls far short of meeting all of the state's requirements, it will enable towns, cities, irrigation, electrical agricultural improvement and co-operative organizations of the state to obtain a stable source of electric power at an economic rate.

One municipality already has taken advantage of provisions of the measure. On the day the measure was signed by the state's chief executive, the city of Tucson, through Mayor Henry O. Jaastad, filed an application for 25,000 kilowatt-hours of electric power. Mayor Jaastad said that if the application is granted, Tucson probably would use the power instead of that generated in a local plant.

REA Controversy Taken To District Court

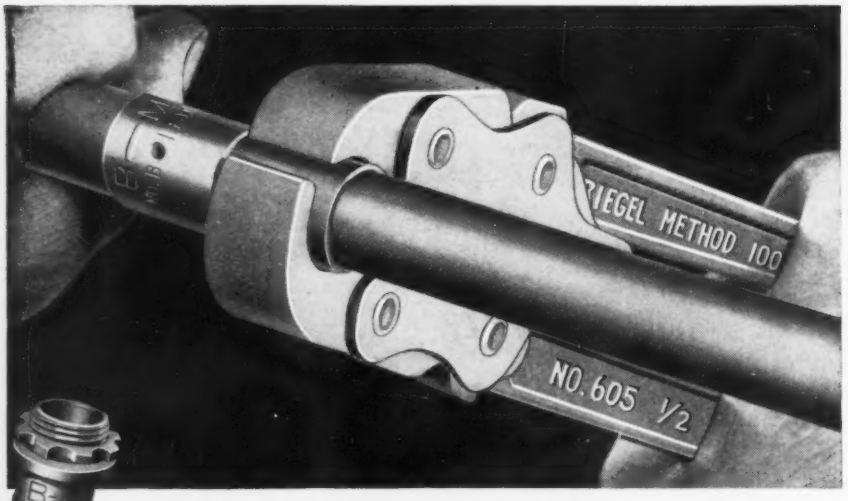
The district court of Bent County, Colorado, has been called upon to settle a controversy raised by the State Public Utilities Commission's mandate that Southeast Colorado Power Assn., REA affiliate, shall relinquish territory on both sides of the Arkansas River (from a mile west of Holly to one mile west of Hasty) to the City of Lamar's municipally owned system. No time for the hearing has been set.

This situation brings into sharp focus the growing antagonism between REA and municipal plants. As conditions now exist, *both* electric systems serve the territory in dispute. In addition to the waste involved in paralleling services, the question of State PUC authority to take jurisdiction enters into the equation.

The same legal technicality was in dispute in the recent Town of Cortez-Empire Electric decision from which resulted a PUC ruling that Empire Electric must amend its by-laws to include non-members; this was done.

● The Appellate Court of California recently ruled that publication of an article in an employees' magazine criticizing commissioners of the Los Angeles Bureau of Water & Power is insufficient cause for the discharge of an employee from a civil service position. The ruling was issued in the case of Zerah H. LaPrade, a junior engineer in the Power Department for 21 years, who was discharged Aug. 28, 1942, following the publication of an article in Civil Service Sentry, official organ of the Municipal Service Assn. of which LaPrade was president.

● U. S. Circuit Court of Appeals at San Francisco last month upheld an FPC ruling ordering Pacific Power & Light Co. to amortize a $2,741,591 fund set up to represent intangibles. The company had asked for a review of the power commission's decision that the fund had been set aside to represent the intangible part of the original cost of the utility properties. The commission had contended that such intangibles should not be allowed to remain permanently in the accounts of a public utility.



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With B. M. Fittings

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SOUTH CAROLINA
Greenville—Edward McCrady

TENNESSEE
Bristol—J. G. Tilley
Memphis—Pidgeon-Thomas Iron Works

TEXAS
Houston—James A. Hall

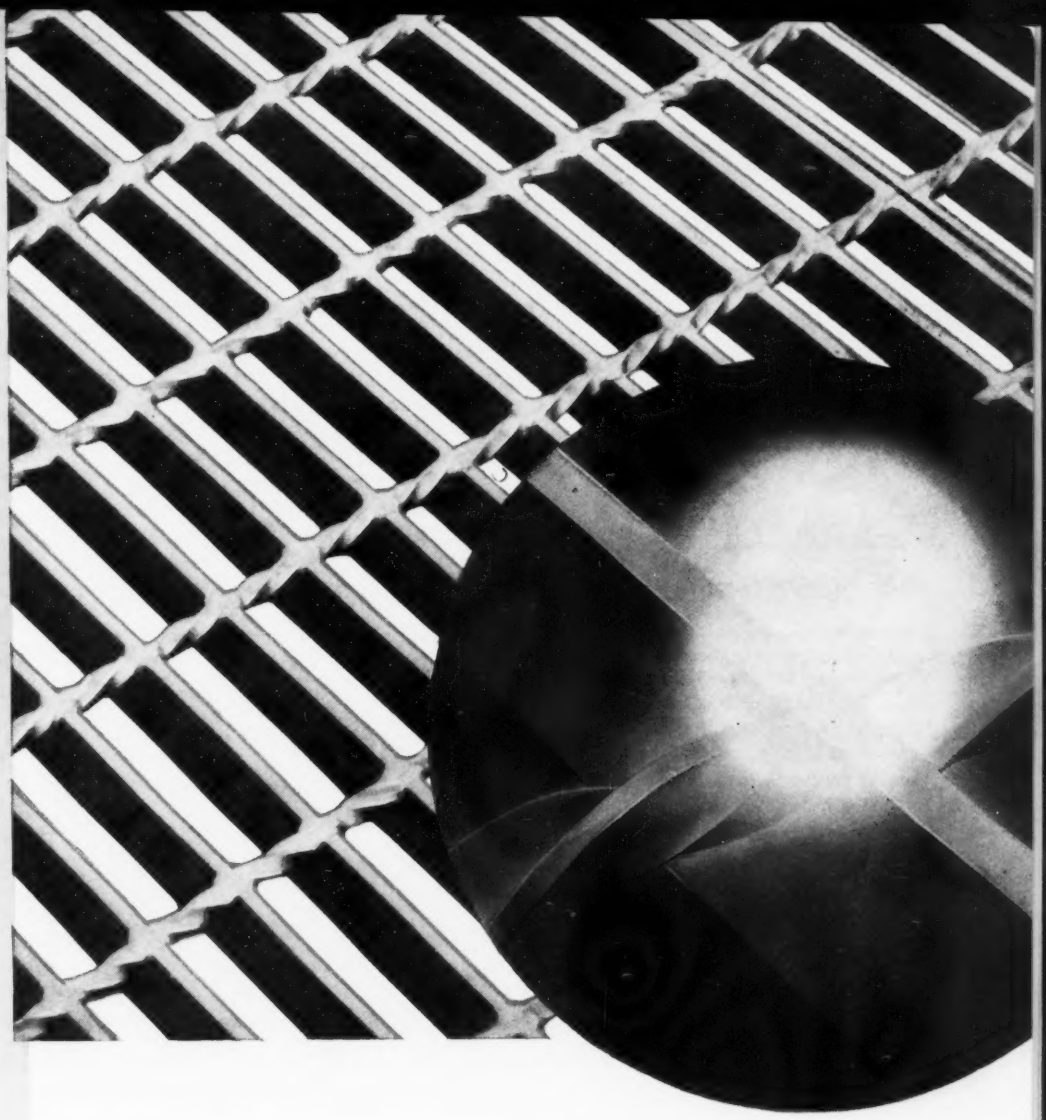
UTAH
Salt Lake City—Harrison & Co.

VIRGINIA
Richmond—W. H. Trausneck
Roanoke—Milliken Co.

WASHINGTON
Seattle—Geo. Montgomery

WEST VIRGINIA
Charleston—Fireproof Products Co.
Clarksburg—A. H. McMunn
Fairmont—Fairmont Mining Mach. Co.

WISCONSIN
Milwaukee—Hunter Tractor & Machinery Co.



No Overhead Under-Foot

BLAW-KNOX ELECTROFORGED GRATING

has proven itself to be a "one time" investment. With the exception of an occasional painting, there is no overhead for repair or replacement to this solid, one-piece grating. It's better 5 ways . . .

1 — Self-cleaning, no sharp corners to clog
2 — Maximum open area for light and air
3 — Easy to maintain — paint reaches entire surface
4 — Strong electroforged construction means easy erection
5 — Safe footing at all times with twisted cross bar

A Catalogue and paper weight size sample will be sent upon request made on a firm letterhead.

There's a Blaw-Knox Dealer Near You

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BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2098 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK · CHICAGO · PHILADELPHIA
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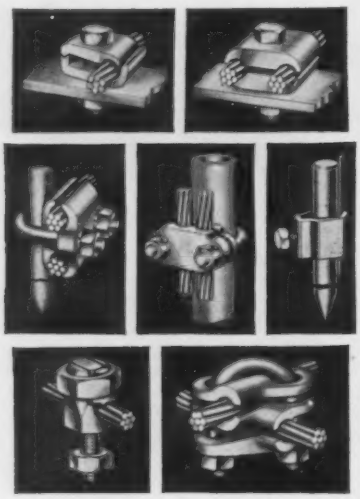
"You can get **ANY** Grounding Connector—

—in the **COMPLETE** line."

The pictures below can only give you an idea of the variety, because **Penn-Union makes ALL good types.**

Write us for any grounding connector, clamp or stud . . . for all combinations of pipe, rod, flat bar, cable, braid, tubing.

Every one a *dependable* unit of protection for personnel and equipment . . . of ample capacity, high mechanical strength, and resistant to corrosion.



Also the most complete line of Service Connectors, Cable Taps, Terminal Lugs, Tees, and other fittings.

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1123 Harrison St., San Francisco

KENNETH ANDERSON CO.
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NORTHWESTERN AGENCIES
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PENN-UNION
Conductor Fittings

RATE REDUCTION ORDER MAY FORM PRECEDENT

In the largest percentage cut in electric rates ever ordered by the California Railroad Commission, Vallejo Electric Light & Power Co. last month was directed to reduce its over-all schedules 18.4% annually. The reduction totals about $135,000 a year; the company's 1943 gross income was estimated at over $730,000.

The new rates will leave the company with more than a 6% return on its undepreciated base, the commission pointed out, and will remove the company from the excess profits tax bracket.

The order was thought to establish commission policy with respect to possible losses in war swollen populations on electric service. Population of Vallejo has jumped to about 100,000 with the influx of workers to the Mare Island Navy Yard.

Establishing its view on cost of meeting added emergency services, the commission specified that the company may write-off certain costs by supplying defense housing over a three-year period. In making a distribution of the $135,000 total reduction, the commission also provided that $65,000 should be applied in the form of a discount on each bill. This would allow flexibility for change in case loss varying from estimates should be realized. A higher than necessary rate of return in the commission's opinion was allowed because of future uncertainties of the federal housing load.

The commission, in a precedential proceeding, also held that the company's rate of depreciation has been excessive. It ordered the charging to future utility customers of only such depreciation as is necessary after reducing the base by the amount of now unexpended depreciation reserve. The commission took the position that when the entire cost of depreciable investment has been returned to the owner, no further contribution for depreciation should be exacted from the utility customer.

Utah Commission, Utility Appear At Rate Hearing

Arguments in the $1,500,000 Utah rate case were heard before the state supreme court last month, with representatives of the state power commission and Utah Power & Light Co. testifying.

The case hinges on the method of property valuation for rate making purposes, with the company contending for "present fair value" and the commission for "original cost." In ordering the reduction last September, the commission set a base of $63,970,254, several million dollars under the power company's figure of $72,000,000.

It was pointed out at the hearing that Utah statute requires that any rate base for public utility services if "just and fair" cannot be set aside by court ruling.

Pending a decision by the high court, the utility is impounding the difference between the present rates and the schedules ordered by the commission. This amount will be rebated to customers as of last Oct. 15, if the commission order is upheld.

Rehearing Denied in PGE Rate Reduction Case

Application of Portland General Electric Co. for a rehearing of its petition for a permanent injunction restraining Public Utilities Commissioner George H. Flagg from enforcing a 10% rate reduction order was denied March 23 by Circuit Judge George Duncan, sitting at Salem, Ore.

The reduction order was originally issued as an emergency measure, but its enforcement was delayed by the issuance of a temporary restraining order. Judge Duncan subsequently decided the Flagg order was valid, and an appeal for a rehearing was entered by PGE counsel.

Attorneys for the utility indicated the case might be taken to the State Supreme Court.

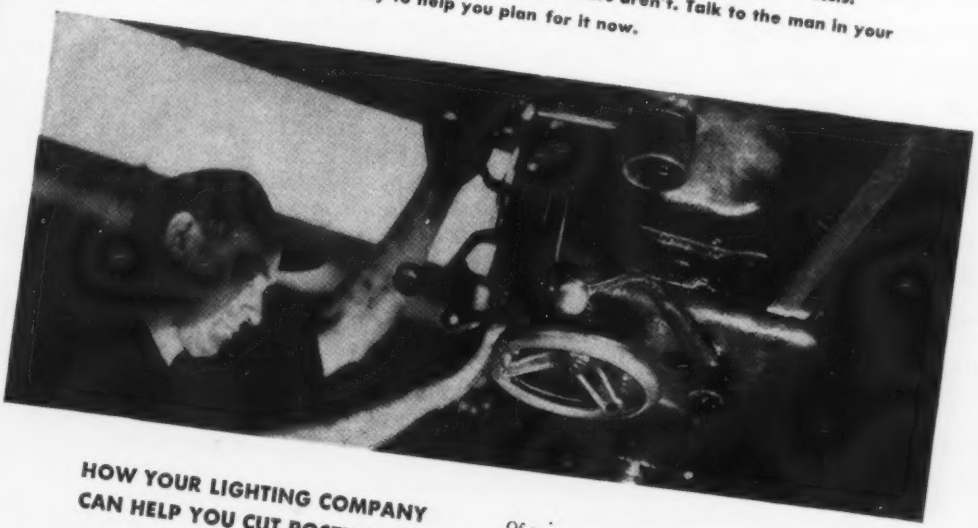
● PUBLIC HEARING of the proposed power and heating equipment code for Ogden, Utah, planned to provide regulations for installation of heating equipment, boilers and furnaces, will be conducted April 6. The code would create an examining board to license power and heating equipment journeymen and provide for the licensing of power and heating equipment dealers.

● ANSWERING THE recent Superior Court ruling on its demurrer in the Sacramento Municipal Utility District condemnation action, Pacific Gas and Electric Co. denied that conversion of its Sacramento distribution system to public operation is a matter of public interest and necessity. Filing of the company's answer is incident to bringing the case to trial.

● ELECTRIC RATE REDUCTIONS totaling $100,000 annually were ordered on the California Electric Power Co. system last month by the state railroad commission. Major savings will be to domestic users, although highest rate of reduction is on street lighting service.

Why is Jones better than Smith?

ON YOUR POSTWAR PAYROLL will be two men—let's call them Tom Jones and Fred Smith. They will do identical work. They will receive identical pay. Yet Jones will be better than Smith—produce better, faster, at lower cost. Why? Because Smith is "weather-sensitive". Summer heat and humidity slow him up. Industry knows the answer—and so do you. It's comfort air conditioning —*and the figures are available on what it promises for lower postwar costs.* Don't dismiss it as a fad. Your competitors aren't. Talk to the man in your town who is ready to help you plan for it now.



HOW YOUR LIGHTING COMPANY CAN HELP YOU CUT POSTWAR COSTS

Right in your city is an engineer-representative of your local utility who has the facts on comfort air conditioning . . . who can help you plan now to make all your employees produce to Tom Jones' level!

Postwar employee relations as well as postwar profits hang in the balance! For air conditioning can influence both—and it is not too early today to find out what it can do for your particular plant—and get it on paper!

Of course your electric company has something to sell. And so has Roebling. When the day comes that electric power takes over the job of filling your plant with year-round, high-efficiency climate, remember Roebling as *wire specialists* who are a logical source of supply for the wires and cables modernization will call for. For air conditioning. Better lighting. Better power distribution to your plant's work. Full utilization of all of the electric and electronic cost-cutters the war has evolved.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

San Francisco • Los Angeles • Seattle • Portland

ROEBLING

PACEMAKER IN WIRE PRODUCTS

Wire Rope and Strand • Fittings • Cold Rolled Strip • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire Wire Cloth and Netting • High and Low Carbon Acid and Basic Open Hearth Steels Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

THIS ADVERTISEMENT is appearing in current issues of *Mill & Factory* and *Purchasing*, carrying this air conditioning message to 39,569 industrial executives. When industrial load building becomes a problem again, we hope that you will benefit from this and other messages which Roebling advertising brings before many branches of industry, month after month.

Full size reprints of the advertisement available on request

RELIABLE CAN HELP YOU

SAVE TIME

in speeding the war program by using Reliable Straightline splices on new construction and on maintenance.

SAVE COPPER

by using these perfect joint making units over and over again.

Positive
Permanent
Low in Cost

Reliable ELECTRIC COMPANY
OVER 35 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO, ILLINOIS

APPLICATION ASKS PERMIT FOR POWER DEVELOPMENT

FPC in March announced receipt of an application from Francis N. Dloughy of Los Angeles for preliminary permit for a 950,000-hp. hydroelectric project to develop resources of the Kings River basin in California. The energy generated would be used for public utility purposes, the application states.

According to the application, the development would include 13 dams creating reservoirs with an estimated total storage capacity of 366,100 acre-ft. It is proposed to connect the reservoirs by conduits and penstocks in such a way that the power would be developed in four power houses—two on the North Fork, one just above the junction of Kings River and the North Fork and one just above the junction of the South and Middle Forks.

If issued, the preliminary permit would maintain priority of application under the Federal Power Act but would not authorize any actual construction on United States lands.

Agreement Ends Controversy Between Tacoma, Bonneville

Saving the City of Tacoma hundreds of thousands of dollars annually, an agreement has been reached whereby the municipal electric system may continue to purchase excess energy from Seattle City Light at a mutual exchange rate of 2 mills and pay for Bonneville power as needed at 2½ mills per kilowatt-hour.

The agreement brings to a close a controversy between Tacoma and Bonneville over the federal power sale formula which required that the government power be purchased on a constant kilowatt-year basis whether used or not.

Tacoma buys about $1,000,000 worth of current a year from both Seattle and Bonneville, and, under the federal formula, would be forced to purchase all its power from Bonneville at a yearly cost of between $1,500,000 and $2,000,000.

Energy Output At Coulee Is World's Record

Energy output at the Grand Coulee power station established an all-time world's record for one month when 604,444,000 kwh. were generated in January, Interior Secretary Harold L. Ickes announced last month. Boulder power plant also made a record in January, with production of 582,351,000 kwh.

These records followed a new high in yearly output by the USBR's 30 plants in 1943. A total of 11,900,000,000 kwh. was generated, showing an output increase of 275% since Pearl Harbor, it was announced. Revenues during 1943 totaled $15,000,000 and estimated 1944 revenue is $18,000,000.

Northwest Projects in Bill Passed By House

The rivers and harbors committee postwar planning bill, including the $69,470,000 Umatilla Dam project on the Columbia River, was passed late in March by the House and has gone to the Senate. The omnibus bill, which carries no appropriation, authorizes construction and improvements totaling nearly $400,000,000.

Estimated cost of the dam was upped $20,000,000 in expectation of increasing power output from 450,000 to 690,000 kw.

For the duration, no work can be undertaken without approval by a war agency, according to provisions of the bill.

First plans for a dam at Umatilla to improve navigability of the Columbia by pooling it to the mouth of the Snake River were advanced in 1921 by representatives of Oregon, Washington and Idaho. In 1923 it was found a dam would also irrigate 5,000 acres of semi-arid lands and generate electric energy.

Umatilla Rapids Dam is part of the greater program for development of power, watering of lands, and improvement of water transportation in the Columbia basin.

Bonneville Starts Survey For Line To Coast

Survey was scheduled to start April 1 for a Bonneville power line from Albany, Ore., to the coast to serve Central Lincoln PUD. Construction will be completed by fall, if manpower and material shortages do not interfere, according to E. F. Altree, PUD president.

The line, a 115-kw. circuit, will make power available to four counties. C. D. Johnson Lumber Co., Toledo, Ore., now a main source of coast power supply, will be retained as a standby.

● Board of Public Works of Seattle has awarded a $1,795,000 contract to the firm of General-Shea-Morrison for construction of two 24½-ft. parallel tunnels around the base of Ross Dam in City Light's Skagit River power development. Light Superintendent Eugene R. Hoffman states that each tunnel will be 1,880 ft. long, and will carry water from the impounding basin to the dam's power generating plant.

Uncle Sam's warships are seeing plenty of action these days. That means inescapable battle damage to essential electrical equipment aboard ship.

"Shell Shocked" Motors

GET WELL FAST!

To help put such equipment back in fighting shape *fast* is the wartime job of many Westinghouse District *Manufacturing and Repair** Plants.

Motor casualties are rushed direct from the ships to these plants—located near Navy repair yards.

Damaged parts are replaced, the entire motor and control reconditioned, using the latest approved methods and materials. Then they're returned to the Navy to be put back on duty.

This emergency service is typical of many that Westinghouse M & R Plants are rendering today—a type of service that's available to all wartime industry.

Every Westinghouse M & R Plant is part of a nationwide service organization—with local branches as close as your telephone. Factory trained men, using factory methods and equipment, are ready to give you complete, dependable repair service on any type of electrical equipment. J-90500

When vital electrical equipment needs repair... phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

Crapo STEEL CONDUCTOR

Rural distribution lines of *Crapo* Steel Conductor will prove efficient, economical and dependable for years under normal operating conditions. The rugged tensile strength inherent in this conductor makes possible long-span, low-cost construction requiring a minimum of maintenance. Relatively low 60-cycle resistance, low magnetic permeability and low 60-cycle reactance contribute to improved electrical efficiency.

For rural extensions authorized by Utilities Order U-1-c, specify No. 6 B.W.G. *Crapo* HTC-130 Stranded (3-wire) Conductor—the size and type recommended for the purpose. For information on this or other applications, contact the nearest office of the Graybar Electric Co., Inc., Distributors, or write direct for Engineering Manual containing complete information on *Crapo* Steel Conductors.

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

INDUSTRY'S PERFORMANCE WINS COFFIN AWARD

In recognition of nationwide achievement in war production, a blanket citation to the electric light and power industry by the Charles A. Coffin Foundation this year replaced the custom of singling out a particular organization for the coveted award.

In announcing the award, Gerard Swope, president of General Electric Co. and chairman of the foundation's board of trustees, pointed out that no other country in the world has so large a supply of electric power for industry, either in total or per workman, or so abundant a supply of light and power for the home.

"Faced with unprecedented demands, the electric light and power industry has met every war production requirement without delay and without impairment of its peacetime services to the public," he said. "This achievement merits the appreciation not only of American industry but of the entire nation."

Pointing to the fact that the Army and Navy, through their E awards, have given public recognition to the contribution of industry, Swope said that no similar public recognition has been given to the great contribution of the organizations supplying electricity to industry and the public.

Electric Safety Week Sponsored in Washington

ELECTRIC CLUB of Washington, working with the Seattle Fire Department, will sponsor an *Electric Safety and Education Week*, April 23-29. Captain Stephen E. Sanislo, safety engineer of the Fire Department, will work in cooperation with the Electric Club committee, and will serve as chairman. The committee includes Al Pollard, Puget Sound Power & Light Co.; Jim Ferguson, Seattle City Light; Les Stewart, City Electric & Fixture Company and Ray Larabee, of the Underwriters' Laboratories. Purpose of the Safety Week is to inform and educate the citizens in order to bring about a better understanding of the proper use of electrical energy. The Electric Club plans to enlist the cooperation of civic groups, parent-teacher associations, the IAEI and others.

● MONTANA POWER CO. was one of three electric utilities recently granted the National Security Award presented by the Office of Civilian Defense to employers who make superior provision for plant protection. The other two utilities are Pennsylvania Power and Indianapolis Power & Light companies.

USE Mailway Banking

FOR LARGE OR SMALL ACCOUNTS

Whether your account is large or small, business or personal, checking or savings, you will find our Mailway service helpful. We have special facilities to make banking by mail easy and prompt. Our careful attention to your needs will enable you to bank with us by mail, at greater convenience to you

Open a Mailway account by mail

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank

Member Federal Deposit Insurance Corporation
ONE MONTGOMERY STREET

ILSCO
Electrical Connectors

ILSCO electrolytic copper connectors are made from pure copper strips and tubing. Weight is one-third to one-sixth of cast connectors . . . but performance is often superior to heavier and bulkier cast copper alloy connectors.

Buy conductivity . . . not weight!

Western Distributors:
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Please rush us sample and illustrated 32-page catalog

Name .....
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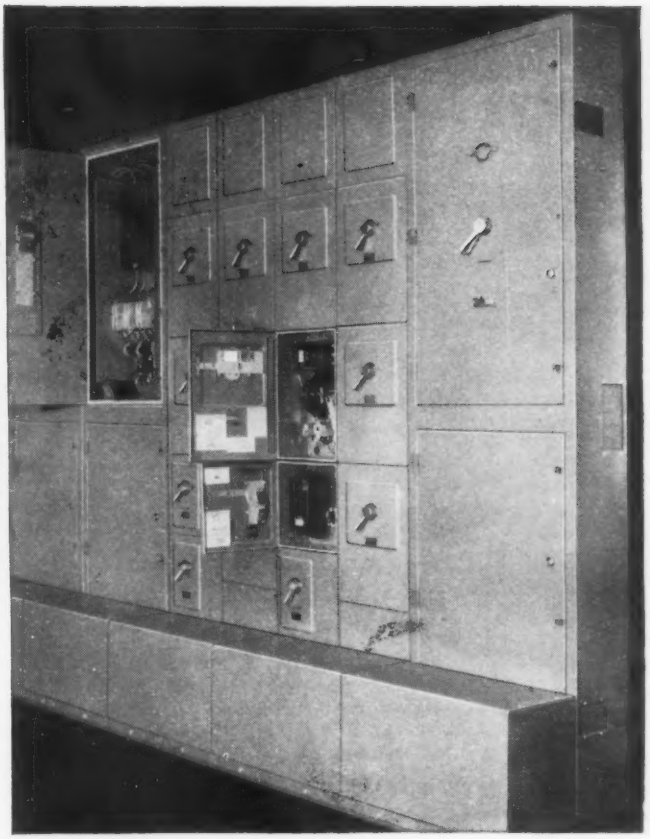
ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

modern "packaging" in TRUMBULL CONTROL CENTERS



☆ **EASIER to BUY in "modern" packages.** This is the NEW and better way to buy electrical control equipment. You order standardized stock units where once you had the expense and delay of "special engineering". You get exactly what you want for the job to be done . . . PLUS unlimited flexibility in planning for future extensions or changes.

☆ **EASIER to install.** Trumbull Control Centers can be installed in *hours* where old time installation took days or weeks. First, the prefabricated bus bar vertical sections, which carry power, are lined up and connected to mains. Then the necessary combinations of control units are simply "plugged in" to the sections. That's all there is to it. Installation may be back-to-back or flat against walls because everything is accessible from the FRONT.

☆ **EASIER to extend, rearrange or relocate.** Trumbull Control Center installations are as flexible in this respect as a "row of filing cabinets". You can add or remove sections; you can rearrange control units within the sections. You can rearrange the entire installation if your shop power requirements change in the future.

☆ **EASIER to provide adequate protection against shutdowns . . .** first through centralized group control that assures a uniformly high standard of electrical safety for *all* equipment in a department. Secondly, by isolating one department or plant section from another as far as electric power is concerned.

☆ **EASIER TO SERVICE.** All dead front construction . . . all units and entire mechanisms inspectable and removable *from front* . . . wiring connections easily made *from front.*

☆ **EASIER TO LOOK AT.** Thin cross section, totally enclosed, beautifully finished in machine gray enamel, Trumbull Control Centers are the "show pieces" of most plants where they are installed. Good looks are important . . . and especially so when they are the result of correct design, expert construction and high quality throughout.

Write for Trumbullaid Bulletin No. 411.

TRUMBULL CONTROL CENTERS

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY . PLAINVILLE, CONN. . A GENERAL ELECTRIC ORGANIZATION

OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES

FACTS ABOUT
Nicopress
SPLICING SLEEVES

for "80" and "130" High Tensile Steel Power Conductors

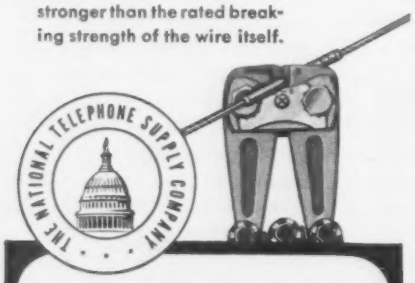
SLEEVE BEFORE COMPRESSING WITH NICOPRESS TOOL

1. Whether the joint is to be made in the air or on the ground, the job can be done faster and easier with Nicopress steel conductor sleeves.

COMPLETED SPLICE

2. The splice will equal the conductivity of the wire and is so tight that the conductor *cannot pull out.*

3. The completed splice is stronger than the rated breaking strength of the wire itself.



The National Telephone Supply Company
5100 SUPERIOR AVENUE
CLEVELAND 3, OHIO
Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA
Export Distributor
INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

UTILITY CAMPAIGN SEEKS JOB-GIVING INDUSTRIES

A national advertising campaign to attract employment-giving industries to the State of Washington in the postwar period will be launched this month by four Northwest power companies serving the state. The four utilities are Puget Sound Power & Light, Northwestern Electric, Pacific Power & Light and the Washington Water Power companies.

In a joint statement released by Frank McLaughlin, president of Puget Sound Power & Light, the four-fold purpose of the campaign was stated as follows: (1) to help those who now have jobs keep them in the postwar period; (2) to create employment for returning war veterans; (3) to help business and industries retain and expand in the future the progress they have made; (4) to avoid the possibility that war industries will become "ghost plants."

Theme of the advertising campaign will be "Washington—the State—has everything!" Advertising in national magazines and eastern newspapers will comprise a part of a double promotional campaign. In addition, a direct mail campaign will take the story to a list of 10,000 leaders of business and industry throughout the United States.

Private Utility Charges Lower, BC Survey Finds

According to a summary of hydroelectric costs recently issued by the Rural Electrification Committee in British Columbia, the average charge per kilowatt-hour for electricity under municipally operated systems in the province is higher than in the case where power is supplied by private companies and industrial organizations. This fact is revealed in a progress report just released by this special committee of the British Columbia government.

The undeveloped water power of the province is not an important factor in the extension of rural electrification and the sparsity and distribution of population makes a general provincial grid system impractical, the summary states.

No material extension of rural electrification can be made on a self-sustaining basis without a reorganization of the central station industry, it adds.

The report lists B. C. as a close second to Ontario in percentage utilization of electricity by farms, and states that, except on the lower mainland, the cost of electric service throughout the rural areas is relatively high and the quality relatively poor.

Sixty-five separate organizations are providing central station service in B. C. and of the 206,723 customers, 38,227 are classified as rural, many of whom enjoy lower rates through proximity to densely populated areas.

Farm electrification, the report adds, will have to develop by extension from local centers of population, some of which are quite small.

Costs of administration are unduly high and an important cost factor, the report says, adding charges by some municipalities in excess of cost are a definite hindrance to increased use.

Stream Flow Subnormal In Pacific Northwest

Continued subnormal stream flow throughout the majority of the Western states and in British Columbia was recorded last month, although it was still too early to forecast conditions this summer.

Surveys in all parts of the State of Oregon by the division of irrigation, U. S. Department of Agriculture, compiled as of March 1 reveal that precipitation in Oregon valleys since Oct. 1, 1943 has been the least for the period since 1937. Not only was the mountain snow cover below average in nearly all snow courses but it was of exceptionally low density. Total water stored in all reservoirs was 10% less than for like periods in 1943 and 1942, although greater than for 1940.

In British Columbia, the 23,500-hp. B.C. Electric steam plant at Vancouver has been running 24 hours a day since the first of the year to save valuable power. This is the first time since 1913 that the plant has been put into continuous operation.

According to C. E. Webb, of the Dominion Water & Power Bureau, in some places the February run-off was lower than it has been during three decades.

The outlook for California's 1944 water supply improved during late February and early March, storms bringing rain to the lowlands and snow in the mountains.

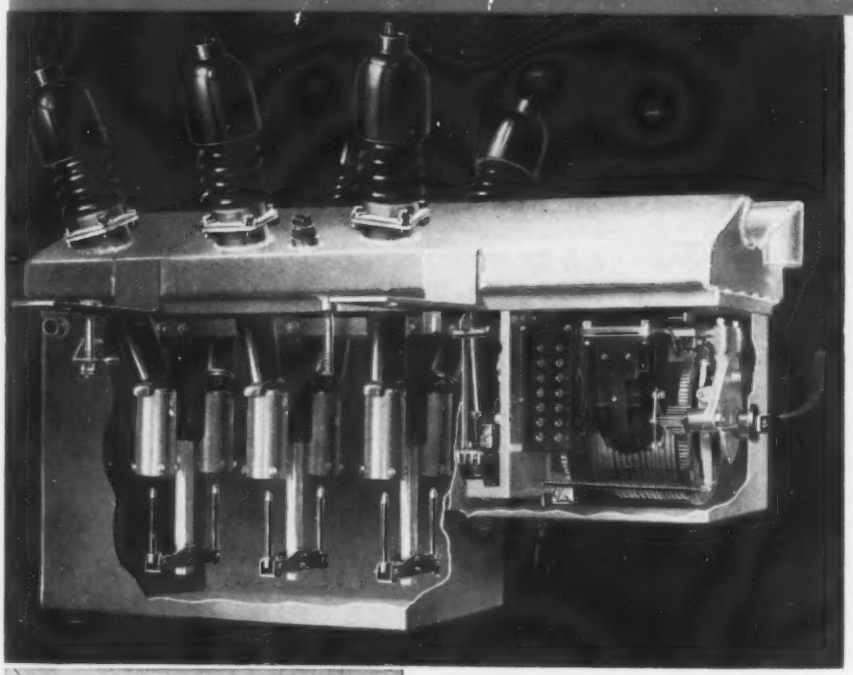
Some improvement was recorded in Washington, with the flow of three index streams in Washington averaging 71% of normal during February. Montana and Idaho also are facing small runoffs.

● REA has received WPB approval for construction of 40 miles of line in Linn County, Ore., at a cost of approximately $40,000. Construction of about 411 miles of REA line in the county was halted by the war. The approved project will start at Bonneville's Albany substation. Approximately 102 families will be served.

END OUTAGES

Caused by Transient Faults

ON RURAL or LOW-REVENUE LINES



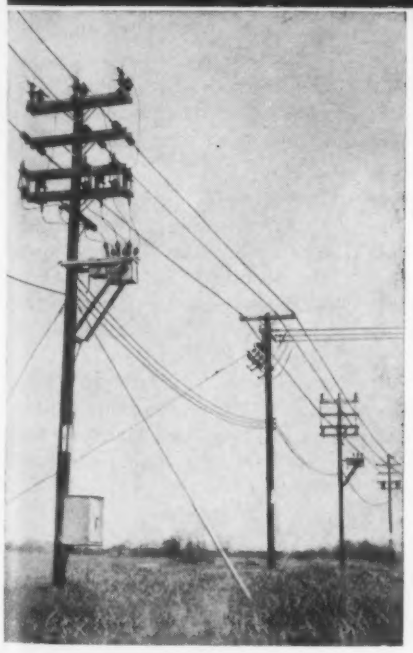
PACIFIC ELECTRIC'S

Motor-Rewound

AUTOMATIC SERVICE RESTORER

Clears Faults Immediately

Type AP-40, 100 Amperes Continuous, 1800 Amperes Interruping Rating, 15-kv.



On Sustained Faults, Positive Spring-Stored Energy Offers 3 Reclosures Before Lockout

When a fuse "lets go" there's usually a long outage, stoppage of war production and loss of revenue.

Most of such faults are transient. Any number of them can be cleared immediately with Pacific Electric's Automatic Service Restorer which is operated by an automatically-prewound spring.

After the first reclosure, its 115-volt motor starts rewinding the spring, taking 60 seconds rewinding time for the energy expended in each reclosure operation. If faults are 60 seconds apart, the spring is always fully wound—giving you 3-reclosure protection at all times before lockout which occurs on sustained faults.

You get a choice of reclosing intervals, also easy outside adjustments of current and inverse-time-delay tripping. Emergency manual operation is provided.

You get fast arc extinguishment with the Expulsion Contacts which save oil deterioration. You have greater safety and a saving of line patrolling. Special accessories available for special applications.

Made by the Pacific Electric Mfg. Corporation, for 38 years specialists in line-protection equipment, the low-cost Motor-Wound Automatic Service Restorer reduces outages to momentary duration at scores of installations. Find out more about clearing any number of transient faults immediately on rural or low-revenue distribution lines.

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Linemen are entitled to the protection of . . .

TIPS GROUND SETS

Linemen making repairs on supposedly "cold" lines are entitled to the best grounding protection you can give them and the pages in your Tips Tool catalog will present to you the best that money can buy.

A typical example is the grounding set shown above, designed for 3 wire construction, 4/0 stranded copper to 3/0 ACSR, maximum conductors. This set is applied with a Grip-All clamp stick, shown at left. (One such set should be placed on each side of the location where men are working.) All cable contacts are tightened by pressure clamps before application. Eye screws are easily manipulated with Grip-All or other clamp sticks and tighten quickly on the conductors. There are no hazardous loose contacts as in the case of grounding chain. This same set is available with poles mounted ready for application.

This is only one of a half dozen different grounding sets shown in your Tips catalog. All are available either mounted or unmounted. You will also find a wide variety of clamps and accessories. Consult this book or your electrical jobber. There's no need to risk inferior equipment when Tips Grounding Equipment is still available. "There's nothing too good where life is at stake."

A·B·CHANCE CO. CENTRALIA MISSOURI

OWU MOVES TO BUILD UP INVENTORIES IN WEST

Opening a campaign to build up inventories of Pacific Coast power systems in anticipation of increased demand when the war effort is concentrated against Japan, the OWU Inventory Control Branch has asked major eastern companies to prepare lists of available new or first-class material needed by West Coast utiliites.

Harry C. Wolfe, chief of the Inventory Control Branch, estimated that as much as $10,000,000 worth of material will be stocked by Pacific area systems in preparation for demands of 1945 and 1946, and hoped that between $5,000,000 and $6,000,000 worth of it would come from inventories of eastern companies.

In letters to the eastern systems, Wolfe pointed out that sales from inventories of companies which are near manufacturers would minimize the additional burden on manufacturers as well as prepare West Coast systems for any increased loads. He added that movement of the necessary material from inventory would hasten shipments and lend assurance that the burden on rail facilities caused by this program will be out of the way before westbound war traffic reaches its peak.

A "substantial" amount of material from inventory is already under negotiation between east and west coast systems considering the short time the program has been in effect, Wolfe added.

It was emphasized that the program is by no means limited to those east coast companies which were asked to prepare lists of available material. These companies were solicited because they have large inventories.

The Inventory Control Office asked that Western companies be supplied with lists of available cable, bare and weatherproof copper wire, power and distribution transformers, line hardware, steel pipe, valves and meters and accessories, with size range, voltage range and type specified.

Since eastern companies can replace whatever material might be required with a minimum of difficulty, it was suggested that not only material in excess inventory be offered for sale but also as much material in practical working minimum inventory as can be spared be included. To keep price differences at a minimum, OWU asked that only new or first-class material be offered. OWU will not negotiate any prices, but asks that "prices fair to both parties" be agreed upon.

● B. C. Electric Railway Company at Vancouver, B. C. is installing $65,000 worth of equipment to double its Haro Street substation transformer capacity of 15,000 kw. Civic Board of Zoning Appeal has given the company permission to build a temporary addition to the substation to shelter the machinery. Present transformers, serving the West End and part of the downtown business district, are loaded to capacity, the company explained.

Proving that a million horsepower of energy can't accomplish everything, Grand Coulee workmen recently found it necessary to use "catpower" in a construction job. To string 500 ft. of cable through a 24-in. winding drain pipe, a string was tied to the cat and its movement through the pipe energized by a blast of compressed air. The string was then tied to a rope and the rope to the cable

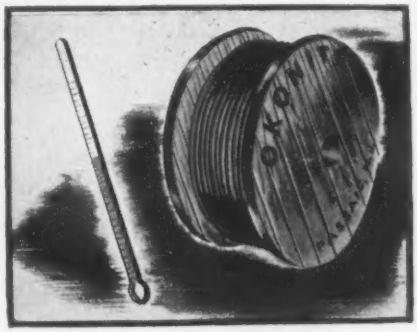
● Highline Electric Assn., Holyoke, Colo., has been granted an additional $60,000 from REA funds. This association has received $410,000 from REA with which to extend 532 miles of line in the Haxton-Dailey communities of Northeastern Colorado.

Other recent REA grants in Colorado include $15,000 to the Union Rural Electric Assn. at Brighton, and $15,000 to the San Isabel Electric Assn. at Pueblo.

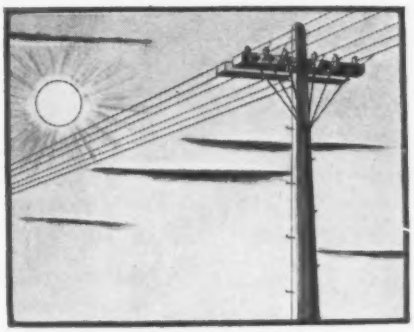
● In an effort to make postwar rural electrification planning a reality, Puget Sound Power & Light Co. will attempt to reach all families without electric service through newspaper advertisements incorporating a questionnaire, according to Frank McLaughlin, company president. By obtaining up to date information on homes and farms still unserved, the company hopes to realize its goal of 100% electrification after the war.

HOW TO PROTECT WIRES AND CABLES FROM THEIR ENEMY—HEAT

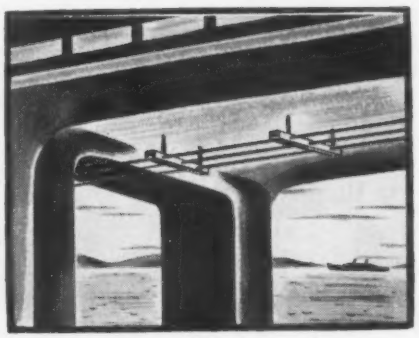
Heat is a serious threat to the long life and efficiency of electrical wires and cables, destroying covers and insulation on the reel and on the job. Yet a few simple precautions can go far to extend the life of the cable or wire. In operation, the more you reduce the temperature of the surrounding air, the longer insulation will last with the same conductor load. Or, if necessary, more current can be carried in the same cable without shortening its life. Here are some suggestions that will pay well:



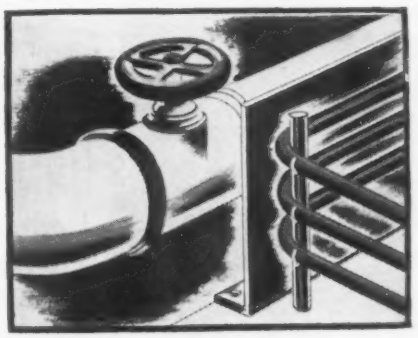
STORE CABLES IN A COOL — NOT COLD — PLACE. Stored in a cool, uniform temperature, cable insulation is maintained in the best condition for the longest possible life. Avoid extreme temperatures Keep cables under cover.



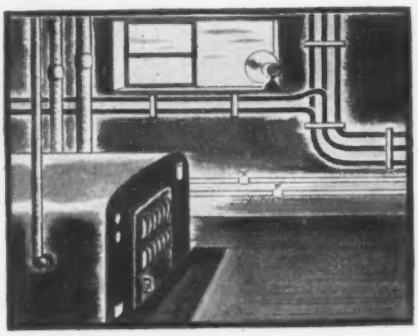
INSTALL RISER CABLES ON THE NORTH or most shaded side of poles — away from the heat of the sun.



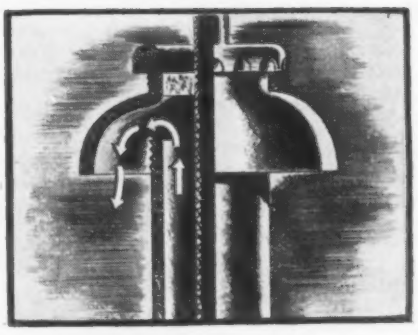
ON BRIDGES, VIADUCTS, ETC., PLACE CABLES BELOW THE STRUCTURE for protection from sun and weather. This also is more likely to add protection against accidental mechanical damage, vandalism and sabotage.



NEAR HEATING UNITS or hot pipes, move the wiring or insert baffles between the source of heat and the cables to deflect hot air.



IN HOT LOCATIONS—cut air vents in the ceiling or partition above cables to provide adequate circulation by means of natural convection or install fans.



VENTILATE POLE RISER CONDUITS and create circulation by making openings near the top or by leaving space between the conduit and pothead. This can improve the efficiency of an entire circuit.

Our engineers and research staff are anxious to help you prolong cable life. We will be glad to answer questions which may help you solve problems concerning protection and longer use of your electric wires and cables. No obligation is incurred by this service. The Okonite Company, Passaic, New Jersey.

OKONITE

Insulated Wires and Cables

3587

WISH I HAD A
Thermador
AT HOME, TOO!

Heats in Winter
Cools in Summer

For many years, Thermador Fan Type Portable Electric Heaters have been providing comfort, convenience, and economy for American homes and plants.

Now they are essential in speeding up war production by improving industrial working conditions. Clean, compact, and safe, Thermador double-purpose units furnish warm air in winter—circulate cool air in summer. Flameless, fumeless. Thermator Heaters are available on priority orders in portable or built-in types for use on 115-volt A. C. service, 1650 watts capacity, or 230-volt A. C. in capacities up to 5000 watts.

Write Today for Catalog EW4

ARMY E NAVY

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Electric APPLIANCES
THERMADOR ELECTRICAL MFG. CO.
5119 So. Riverside Drive, Los Angeles
Seven Leagues Ahead

PEOPLE
made this news

Brundige Made Manager Of PG and E Division

Lamonte J. Brundige, sales manager of the Sacramento division of Pacific Gas and Electric Co. since 1928, has been appointed manager of the company's De Sabla division with headquarters at Chico. He succeeds the late J. H. Fagg.

At the same time, the company announced two other promotions, occasioned by transfer of Brundige to Chico. W. R. Bowler, sales manager at Chico, becomes sales manager of the Sacramento division. W. L. Greer, sales supervisor of the San Jose division is promoted to sales manager of the De Sabla division, succeeding Bowler.

Brundige will assume his new position at Chico with a record of more than 20 years' experience in utility operation. Joining PG and E immediately after graduation from the University of California in 1923 he served successively as illuminating power engineer of the North Bay division at San Rafael, assistant superintendent of the new business department and division sales manager. He was transferred to Sacramento as division sales manager in December 1928.

Maydwell & Hartzell Advances Mulvany

Transfer of Fred A. Mulvany to Los Angeles as resident vice-president for Southern California was announced recently by Maydwell & Hartzell, engineers and manufacturer's representatives. He had been manager at San Francisco since the fall of 1939.

Associated with the electric industry on the Pacific Coast for more than 25 years, Mulvany started his career with Great Western Power Co. He also served the old Pacific Electric Co., predecessor of G-E Supply Corp., as transmission specialist in the Northwest and in San Francisco. Before going with Maydwell & Hartzell, he was sales manager for Leo. J. Meyberg Co.'s appliance department

● F.R.MERRIS of Tacoma, Wash., has been appointed general manager of the Washington Gas and Electric Co. Since 1930 he had served as secretary treasurer of the firm and was previously associated with the Ohio Electric Power Co. in Sidney and Columbus, Ohio.

A Size for Every Wire Joint
IDEAL
Wire Nuts
Solderless, Tapeless Wire Connectors

NO RESTRICTIONS

Government approved as alternate for solder-and-tape joints. Simply strip wires, screw on—that's all! Fully Approved. Listed by Underwriters' Laboratories, Inc.

PROMPT DELIVERY
FREE *Samples on Request*

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WEST COAST WAREHOUSE STOCKS:
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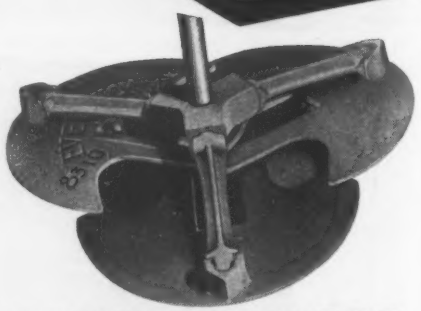
F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
W. J. Gottrell, 131 S.W. 4th Ave., Portland, Oregon
Robinson Sales Co., 3215 Western Ave., Seattle, Wash.

First CHOICE IN ANCHORS



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For dependable anchoring under all conditions, use Eversticks. Made of tough, rust-resistant, malleable iron . . . quick and easy to install . . . expand in undisturbed earth. Preferred by engineers and crews alike.

Write for latest Everstick bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Pacific Electric Names Marshall Vice-president

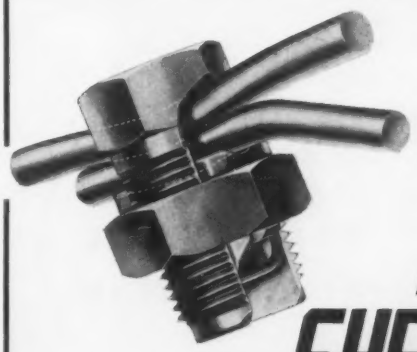
William R. Marshall last month was appointed executive vice-president of Pacific Electric Mfg. Corp. of San Francisco. Well known to the industry on the Coast, Marshall was for many years with Westinghouse before resigning in 1940 to establish his own business.

MARSHALL

He started with Westinghouse in 1909, was in the power department and in the New York, Buffalo and Pittsburgh offices In 1928, he came to the West to organize the Pacific Coast district, of which he was manager. In 1933, he was made vice-president in charge of the district and in 1940 he resigned to establish the Moore Machinery Co. in San Francisco.

● CHARLES E. SCHNELL has been appointed San Joaquin division superintendent of maintenance and construction for Pacific Gas and Electric Co., succeeding the late C. P. Rhine. Schnell recently returned to Fresno following a leave of absence with the War Production Board in Washington, D.C. Previously he had been division substation construction engineer. With WPB 17 months, his work was to analyze construction plans for power lines with a view to substitution of non-critical materials.

● ROBERT LEE, public relations director for the Department of Water & Power, resigned recently to join the Los Angeles office of Buchanan Co., advertising agency. His new office is in the Philharmonic Auditorium Building, 427 W. Fifth St.



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ENGINEERED
CONNECTORS

NOW SOLD EXCLUSIVELY
ON THE WEST COAST
BY

TRIANGLE PACIFIC CO.

SPLIT-BOLTS
The Snub-Grip with the Least Friction

NO-BOLTS
HIGH-Pressure, Internal-Expansion Type for Tubular Buses

EV-R-ONS
Better-Made, Solderless Cable Terminals

LIMITERS and CRAB JOINTS
For Use on Underground Network Systems

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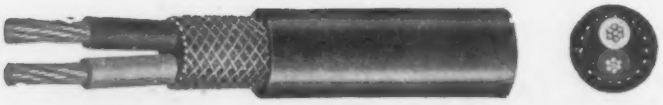
"You're *Well* Connected with SHELDON"

EARL S. CONDON COMPANY
357 S. Hill Street Los Angeles 13, California

UNITED STATES RUBBER CO.
Wire and Cable Division

ALL TYPES RUBBER AND SYNTHETIC COVERED WIRES AND CABLES
CORDS WEATHERPROOF
ELECTRICAL TAPES



Earl S. Condon Co., represents: UNITED STATES RUBBER CO. Wire and Cable Div. LAPP INSULATOR CO., INC. • BURNDY ENGINEERING CO., INC. • COLE ELECTRIC CO.

Answer To "Who Am I?"
Ralph A. Hopkins
(See Page 86)

● LEE W. RALSTON, former member of the California State Department of Education, has been named supervisor of industrial relations for the Westinghouse manufacturing and repair department, Pacific Coast District. He will be responsible for company-employee relations at the Emeryville headquarters and at branches in Los Angeles, Portland, Seattle and Salt Lake City.

● M. C. HANCOCK, a veteran of 34 years with the Washington Gas & Electric Co., has been appointed superintendent of the company's distribution system in Tacoma to succeed the late Joseph H. Harris. Prior to his appointment to the Tacoma position, Hancock had been manager of the company's Grays Harbor branch with headquarters at Aberdeen.

● HENRY ALDERMAN, director of information of the Bonneville Administration, Portland, has resigned to accept a position with Coronet Productions, motion picture end of *Coronet* magazine. His address will be 366 Madison Ave., New York. His place has been taken by JACK GRISWELL, acting director of information.

● GENERAL ELECTRIC CO. has announced the appointment of Robert W. E. Carruthers to its San Francisco staff. He will serve the expanding petroleum industry in the Bay Area as petroleum specialist.

● CARL ERNST, employee of California Electric Power Co. since 1920, recently was appointed executive assistant, with headquarters at Riverside. He will report to general manager A. G. Cage. Since 1934 Ernst had been vice-president and division manager in charge of the company's Nevada business and recently he handled details in connection with transfer of the Imperial Valley properties to the Imperial Irrigation District.

● FRED H. LUITHLE has been named stores manager for Westinghouse Supply Co.'s North Pacific district, with headquarters at Seattle. He succeeds RALPH H. SROUFE, who has been transferred to Des Moines as Iowa division manager. Luithle's former position as assistant stores manager will be filled by promotion of MERRITT UPSON.

● E. W. ROCKWELL, on Metropolitan Water District's electrical engineering staff since 1931, has been loaned to the Colorado River Commission of Nevada for three months to be its resident engineer and study Nevada's allotment of Boulder Dam power.

● RICHARD B. BORLAND, application engineer for the Westinghouse lamp division at San Francisco and Los Angeles for 19 years, has been appointed manager of the division's Los Angeles office.

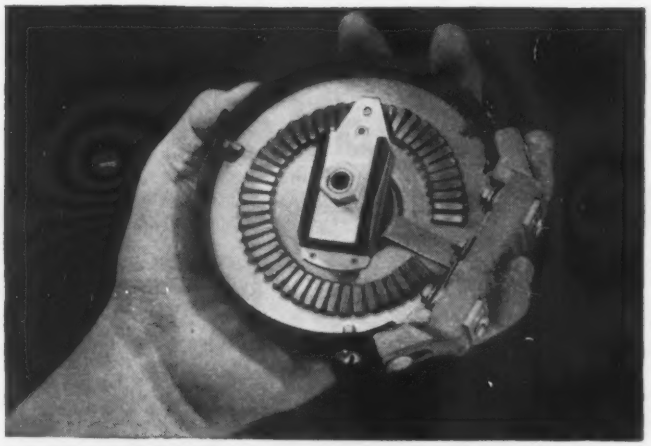
● WILLIAM D. TURNBULL, since 1940 vice-president and sales manager of the Pomona Pump Co. of California, has been named manager of the Westinghouse agency and specialties department at Pittsburgh.

● LEWIS E. SCOTT has joined the staff of Hoffman Radio Corp of Los Angeles as methods engineer. He formerly was industrial engineer for Consolidated Aircraft and Douglas Aircraft.

● SPENCER MOORE, for many years contract representative for San Francisco division, Pacific Gas and Electric Co., with contractors and the building industry, died early in March.

● T. C. CLARKE, district manager in British Columbia for the Northern Electric Co., has been elected as the new president of the Vancouver Board of Trade.

● THOMAS O. QUINN has been appointed city electrical inspector at Burbank, Calif., taking the place of Larry Trim, who recently joined the Army.



A SMALL RHEOSTAT with BIG FEATURES

Ward Leonard has produced their 4" Plate Type Rheostat with all the desirable features of their largest equipment. It dissipates heat from both sides. The contacts are solid metal blocks for durability. Action is smoothness itself. There are forty-three steps of control. Data Bulletins are available on the various Ward Leonard Rheostats. Write for bulletins describing the size and type of Rheostats of interest to you.

WARD LEONARD
RELAYS • RESISTORS • RHEOSTATS
Electric control (WL) devices since 1892.
WARD LEONARD ELECTRIC CO., 68 South St., Mt. Vernon, New York

CHROMALOX
HEATFLO
the replacement electric range unit that SIMPLIFIES YOUR SERVICE PROBLEM

1200-watt and 2000-watt Heatflo units with snap-on adaptor rings enable service man to fit any range.

Chromalox Super-Speed Range Unit repair parts, available without priority, under WPB limitation orders.

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THE PETERSON CO.
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the vital link for
100% PRODUCTION . . .

KLIPLOK Clamps

SAVE

FUSES—CLIPS—POWER

That time-tested jack-screw and INTERNAL tapered-wedge principle literally bolts fuses and clips together without friction loss.

TRICO KLIPLOKS ELIMINATE . . .

- Unnecessary shutdowns
- Night and holiday repairs
- Premature fuse blowings
- Burnt fuses and clips
- Arcing at contacts
- Wasted current

KNIFE BLADE TYPE

FERRULE TYPE

Clamps without the **internal** wedge, or spring re-inforced fuse clips cannot, and do not, exert such pressure—and **it's the pressure that counts.**

Use TRICO KLIPLOKS freely to protect new clips and remedy old clips. They create immediate savings. Use them also for temporary cable splicing, clamping switch jaws, temporary hangers, clamping parts for drilling, soldering, welding, etc. Insist on TRICO—the clamp with the INTERNAL WEDGE! Write for Bulletin No. 6.

COAST REPRESENTATIVES

H. H. Van Luven, Los Angeles — **Wallace R. Lynn Co., San Francisco**
Albert S. Knight, Seattle — **W. E. Young Co., Denver**

TRICO

TRICO FUSE MFG. CO. Milwaukee, Wis.

HELWIG COMPANY

Carbon Products

Multiflex Brushes
Give Better
Commutation,
Longer Life,
Less Commutator Wear,
That Extra Demand Required,
Better Performance
All Around

Pacific Coast Offices

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166 Jackson Street
Seattle, Washington

324 N. W. Broadway
Portland, Oregon

225 W. Pico Boulevard
Los Angeles, California

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THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.

Bulletins on request

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Western Representatives:

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Geo. H. Curtiss, 540 McAllister St., S. F.
H. M. Sayers, 1101 Eastlake Ave.....Seattle
Stevens Sales Co., 41 P.O. Place, Salt Lake City
Felix Simon, P.O. Box 614.....Denver
H. Geo. Shefler, P.O. Box 1587.....Phoenix

● H. S. DUSENBERY, who has been in charge of the electricians training program at the Moore Drydock Co., Oakland, has recently been appointed supervisor in charge of electrical section of the production control department. Dusenbery developed a home study course to aid in the training of shipyard electricians, which was described in *Electrical West* some months ago.

● R. D. O'NEIL, public utilities commissioner at Tacoma, ran third in the city's primaries last month Nominated over O'Neil were C. A. ERDAHL, former state representative, and W. L. GAFFNEY, City Light Department employee.

● W. G. "PAT" PATTERSON has been named manager of distributor sales for Sylvania's California division. He has been with the company since 1935, working both in the radio tube and lighting divisions.

Obituary

● THOMAS E. CAMPBELL, lifetime leader of Arizona and Colorado River affairs and twice governor of the state, died March 1 in Phoenix at the age of 66. He was elected governor in 1918 and 1920. In 1917 he helped organize the League of the Southwest, the first organization of Colorado River basin states. After the war, Governor Campbell was chairman of a meeting of the governors of the seven states which drew up a resolution enabling legislation by Congress for the Santa Fe compact authority. Since 1922 when Arizona signed the compact, he had urged its ratification by the state, a wish fulfilled during the last special session of the legislature ten days before his death.

● JOHN TRUSCOTT ELSON, 63, former vice-president and general manager of Marshall Wells, B C. Ltd., and manager of the company in Spokane since 1932, died there, recently. Mr. Elson was born in London, Ont., and also lived in Cleveland, Ohio, Portland, Ore., and Aberdeen, Ore. He went to Vancouver in 1921 and opened an office for Marshall Wells there.

● GEORGE W. DONNELL, 49, manager of the Electrical Products Co. of San Diego, Calif., died Feb. 28 He was prominent in San Diego civic life.

● HEDLEY B. BRAGG of Bragg's, hardware, electrical appliances and furniture store in Vancouver, B.C., died recently.

TRADE notes

Electric Corp. Tells Management Changes

Changes in the management of the Electric Corp., wholesale distributor of electrical supplies and appliances have been announced by Ross Hartley and Walter Ayden, affiliated since early days as wholesalers salesmen and then as managers of the separate corporations they established in Los Angeles, San Francisco and Oakland, each bearing the Electric Corp. name.

Walter E. Ayden, formerly manager and partner in the Electric Corp. of San Francisco, purchased full interest in the Electric Corp. of Oakland, at 178 Tenth St., and will now devote his entire time to that house as manager and owner.

While Ross Hartley, now owner of Electric Corp. of San Francisco and Electric Corp. of California, in Los Angeles, will devote more time to the San Francisco house, two more of his pioneer associates who with Ayden came to the newly formed company from the old Electric Appliance Co. in 1926, have been promoted to more important managerial positions. R. H. Longfellow, credit manager, becomes the San Francisco manager, and Tom E. Morgan, salesman, becomes sales manager, but one who intends to keep on selling as well. Well known to the industry, these men and Ayden are all receiving congratulations from many friends.

Hartley also announced that the San Francisco house inventories are being expanded and when appliances again become available, it will handle Universal small appliances as it has for years.

● SQUARE D Co. has announced the opening of a direct factory branch at Seattle. The office is equipped to give engineering service on electrical problems and is available for consultation on postwar projects involving electrical applications, according to the company. Square D manufactures a variety of electric control devices.

● PACIFIC ELECTRICAL CONTRACTING Ltd. has been incorporated for the purpose of engaging in business as electrical contractors. Registered offices are at 520 Stock Exchange Building, 475 Howe St., Vancouver, B. C. Incorporation papers show the firm to have 50,000 shares without nominal or par value.

● RALPH LANE, who has been partner to Louie J. Benedetti in the Seattle electrical contracting firm, Industrial Electric Co., has bought out the latter's interest. The two had been associated about eight years. Industrial Electric Co. specializes in electrical contracting, line construction and motor repair.

● M. P. LEWIS, assistant general manager, wire and cable department, and W. A. Armstrong, manager of the Bristol factory of U. S. Rubber Co. toured the West in company with Fred D. Benz, district manager wire sales, Pacific division, San Francisco, during March.

G.C.A.

Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue

We have been making safety tools for 26 years

THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

FOR A GOOD CONNECTION

Make *Your Connection* with Sherman Fittings

Sherman Electrical Fittings are standardized to the most exacting technical specifications. They are made of highest grade materials, ruggedly constructed and correctly designed. Sherman Fittings insure a maximum surface contact and a permanent, durable connection.

Order Sherman Fittings from your favorite jobber. Be sure to specify "Sherman".

MARWOOD LIMITED

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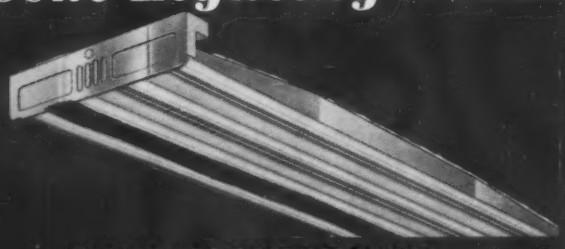
In a nut-shell..

There's a Guth FLUORESCENT FIXTURE

for Every Fluorescent Lighting Need!

GUTH ARISTOLITE



GUTH LIGHTRONICS

GUTH FUTURLITER

GUTH EXCELUX

GUTH SUPER-ILLUMINATOR

The amazing completeness of the GUTH Fluorescent Line assures you, and your customers, of your unfailing ability to meet every modern lighting need. Write or wire today for Representative to call with actual Samples.

Important

Guth High-Bays of Aluminum NOW AVAILABLE!

Genuine Pre-War Models of GUTH High-Bays *are ready now* for shipment on A-1-J priority or higher! This prompt availability is the result of—1) Special Government authorization; 2) Our own Aluminum already on-hand; 3) our Alzak Department in steady operation. Remember, it's *PATRIOTIC* to install the longest-lasting, best-performing High-Bays. Push GUTH High-Bays hard! Write for Folder 760—just published.

Ultra-Violet

FOR SCHOOLS • HOSPITALS • OFFICES

GUTH Germicidal Fixtures, which destroy air-carried bacteria and help control contagion, provide you a new, fertile field for sales and profits. Full engineering data, layout tables, advertising stuffers, and a new GUTH Germicidal line are ready NOW. Get full details NOW!

The Edwin F. Guth Co. • 2615 Washington Ave. • St. Louis 3, Missouri

Guth

The Manufacturers' Directory

TO USE THE DIRECTORY, locate the listing of the manufacturer you wish to contact. Under the company's name are listed the Western branch offices or Western representatives. If the name of the manufacturer is not known, turn to the "Where to Buy It in the West" guide and look under the product heading. • Every manufacturer operating in this territory is privileged to be included without charge. While this Directory is as accurate and complete as the publishers could make it, ELECTRICAL WEST assumes no responsibility for errors or omissions.

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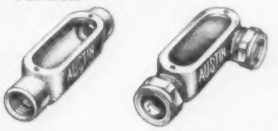

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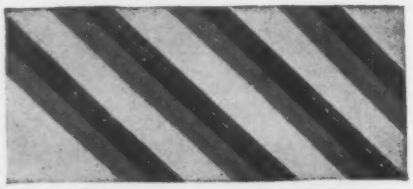

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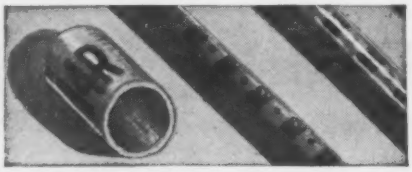

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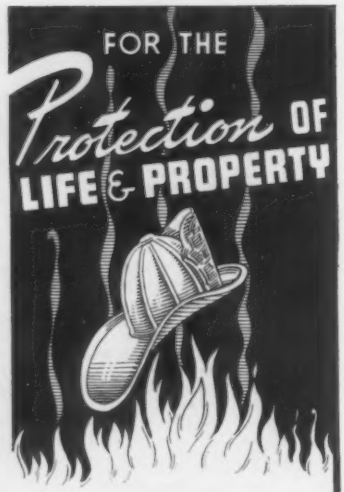

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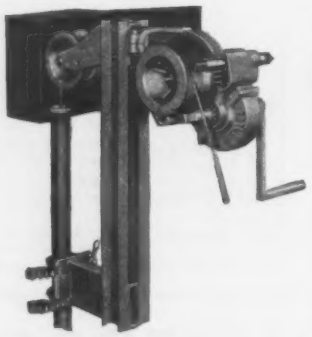

Cable Puller

To the left is the Greenlee Cable Puller set up for pulling into a box from a vertical section of conduit. Can be used in any position, is easy to take to the job, and easy to set up and operate. Ask for Cable Puller circular.

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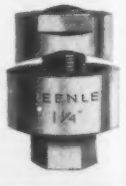

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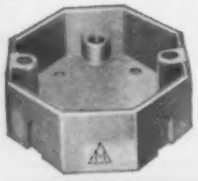

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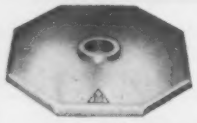

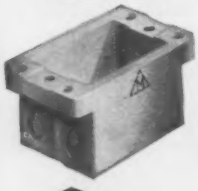

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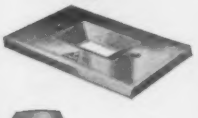

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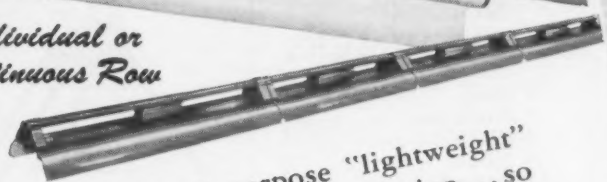

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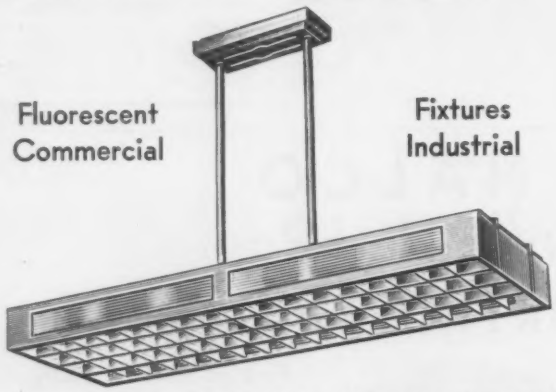

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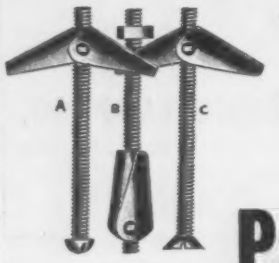

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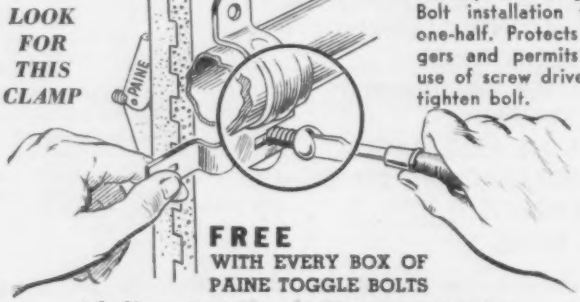

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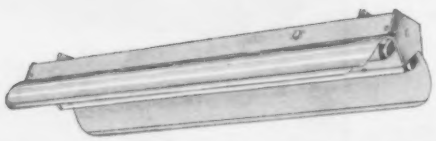

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Westinghouse Elec. & Mfg. Co.

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General Elec. Co.
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Landers, Frary & Clark
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Super-powered! Blows high velocity, low pressure air blast. Six models. Complete suction, blowing and spraying attachments available.

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Use No Solder—
For Electrical Wire Connections

All clamping lugs are made of copper or bronze. Their great strength eliminates distortion and breakage that in the past was caused by excessive wrench pressure. Nutype Connectors do away with soldering and permit the use of hard drawn copper wire instead of soft drawn. The copper content ranges from 90% to 99%, therefore they are highly corrosion resistant and will not season crack. They provide other advantages such as Lower cost—Save time—Promote safety—No radio interference—Continuous service from the same Connector—No sharp edges to nick wires and gloves. Furnished in 13 sizes from No. 10 to 1,000,000 C.M. With and without nut retainers.

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National Elec. Products Corp.
Okonite Co.
John A. Roebling's Sons Co.
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Westinghouse Elec. & Mfg. Co.

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Geo. E. Honn Co.
Line Material Co.
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Bowie Switch Co.
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Geo. E. Honn Co.
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Kwikon Co.
Line Material Co.
W. N. Matthews Corp.
Pacific Elec. Mfg. Corp.
Railway & Indus. Eng. Co.
Schweitzer & Conrad, Inc.
Square D Co.
Waltham, DeWitt & Krusi
Westinghouse Elec. & Mfg. Co.

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Hubbard & Co.
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Line Material Co.
W. N. Matthews Corp.
Maydwell & Hartzell, Inc.
Ohio Brass Co.
Schweitzer & Conrad, Inc.
The R. Thomas & Sons Co.
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Calif. Elec. Works, Ltd.
Mullenbach Elec'l. Mfg. Co.
Square D Co.
Trumbull Elec. Mfg. Co.

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Associated Sales Engineers
Westinghouse Elec. & Mfg. Co.

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General Elec. Co.
C. R. Hunt
Landers, Frary & Clark
Montgomery Bros.
Wagner Elec. Corp.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
C. R. Hunt
Wagner Elec. Corp.
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Solderless-Tapeless Wire Connectors

Easy to use! A strip—A twist—THAT'S ALL! Save time and money. Five sizes. Fully approved. Millions in use!

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John E. Fast & Co.
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Graybar Elec. Co.
Kwikon Co.
Lew Fittings Co.
Jas. J. Noble Co.
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J. G. Pomeroy Co.
Rutkin Elec'l Sales Co.
Simplet Elec. Co.
The Thomas & Betts Co.

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General Elec. Co.
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Line Material Co.
Pacific Elec. Mfg. Corp.
Penn-Union Elec. Corp.
Railway & Indus. Eng'g Co.
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Fittings, Insulator
Brewer-Titchener Corp.
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Graybar Electric Co.
Hubbard & Co.
Kortick Mfg. Co.
Line Material Co.
Ohio Brass Co.
R. Thomas & Sons Co.
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Curtis Lighting, Inc.
Day-Brite Lighting, Inc.
General Elec. Co.
Harold M. Hudson Co.
The Miller Co.
James Mundstock
Pittsburgh Reflector Co.
Preferred Equipment Engineers
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Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.
Wheeler Reflector Co.

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Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.

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Bright Light Reflector Co.
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Geo. H. Curtiss
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Graybar Elec. Co.
Line Material Co.
The Miller Co.
Overbagh & Ayres Mfg. Co.
Pittsburgh Reflector Co.
Quadrangle Mfg. Co.
S & M Lamp Co.
Smoot-Holman Co.
Waltham, DeWitt & Krusi
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Bright Light Reflector Co.
Bryant Elec. Co.
E. B. Cook Co.
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Day-Brite Lighting, Inc.
Electric Agencies, Inc.
General Elec. Co.
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Graybar Elec. Co.
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Lloyd Products Co.
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Smoot-Holman Co.
H. B. Squires Co.
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Westinghouse Elec. & Mfg. Co.
Wheeler Reflector Co.
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General Electric Co.
Geo. E. Honn Co.
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Westinghouse Elec. & Mfg. Co.

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Appleton Elec. Co.
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General Elec. Co.
Line Material Co.
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Edison Gen. Elec. Appliance Co.
General Elec. Co.
Landers, Frary & Clark
Noblitt-Sparks Industries, Inc.
Thermador Elec'l Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Johns-Manville
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Lapp Insulator Co.
Mica Insulator Co.
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Victor Insulators, Inc.
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Corning Glass Works
Graybar Elec. Co.
Line Material Co.
Maydwell & Hartzell, Inc.
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Tom Wood

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General Elec. Co.
Graybar Elec. Co.
Henger-Seltzer Co.
Geo. E. Honn Co.
Illinois Elec. Porcelain Co.
Lapp Insulator Co.
Line Material Co.
Locke Insulator Corp.
Marwood Limited
Maydwell & Hartzell, Inc.
F. M. Nicholas Co.
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Webster Elec. Co.

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Associated Sales Engineers
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Duncan Elec. Mfg. Co.
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L. A. Nott
T. R. Routh Co.
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ELECTRIC MARKER

—Permanently marks all materials including ordinary metals. Delivers 7200 cutting strokes per minute. Diamond point available.

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—Engrave smooth surface steel and iron. Four models—"Thin Line" to "Heavy Duty." For a.c. only.

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Mullenbach Elec'l Mfg. Co.
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T. R. Routh Co.
Square D Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Nails & Staples
Appleton Elec. Co.
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Copperweld Steel Co.
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Kwikon Co.

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Shell Oil Co.
Standard Oil Co.
Union Oil Co.

Oil, Transformer & Switch
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Shell Oil Co.
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Rutkin Elec'l Mfg. Co.

Panel Boards
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Bull Dog Elec. Products Co.
Federal Elec. Products Co.
General Elec. Co.
Mevers Safety Switch Co.
Mullenbach Elec'l. Mfg. Co.
Square D Co.
Trumbull Elec. Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Photoelectric Cells
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Weston Elec'l Instrument Corp.

Pins, Wood
Line Material Co.
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Plants, Volt Lighting
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Westinghouse Elec. & Mfg. Co.

Platers
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Graybar Electric Co., Inc.
Hubbard & Company
Kortick Mfg. Co.
Line Material Co.
Malleable Iron Fittings Co.
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Maydwell & Hartzell, Inc.
Ohio Brass Co.
Waltham, DeWitt & Krusi

Poles
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Maydwell & Hartzell, Inc.

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Illinois Elec. Porcelain Co.
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Victor Insulators, Inc.
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Preservatives, Wood
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Osmose Wood Preserving Co.

Protectors, Guy Wire
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Geo. E. Honn Co.
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Pullers, Slack
Greenlee Tool Co.
Mathias Klein & Sons
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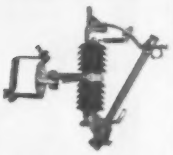
Porcelain Housed Matthews Cutouts

Matthews Fuswitches and Cutouts

For Primary Distribution Transformer Fusing Protection



Open Type Matthews Fuswitches

● Matthews Cutouts and Fuswitches are made in enclosed and Open Types, both dropout and non-dropout styles. Enclosed types furnished in 14 catalog numbers for all ratings to 200 amperes and 7500/12,500 GRD. Y volts.
Open types furnished in 20 catalog numbers for all ratings to 100 amperes and 23,000 volts.
Reclosing Fuswitches, convertible disconnecting blades for above Cutouts, and Disconnecting Switches in several styles are included in the complete line.
Matthews Universal Fuse Links supplied for above, will also fit other makes.
All above comply with E.E.I.-N.E.M.A. 100-6, rating standards.
Write for complete descriptive catalog.

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Norge Div. Borg-Warner Corp.
Thermador Elec'l Mfg. Co.
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Bright Light Reflector Co.
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Geo. H. Curtiss
Day-Brite Lighting, Inc.
Geo. A. Gray Co.
Overbagh & Ayres Mfg. Co.
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Quadrangle Mfg. Co.
RLM Standards Institute, Inc.
S & M Lamp Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.
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Copperweld Steel Co.
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Hubbard & Co.
Line Material Co.
Oliver Iron & Steel Corp.
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Wheeler Reflector Co.

Substations, Outdoor
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Paul S. Everley Co.
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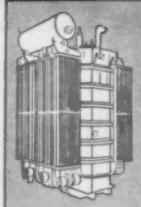
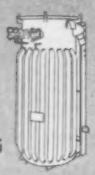
Westinghouse Elec. & Mfg. Co.

6 Wagner BRANCH OFFICES

To serve you on all of your TRANSFORMER REQUIREMENTS



WAGNER POWER TRANSFORMERS



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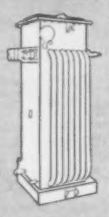

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6 SEATTLE
Wagner Electric Corp.
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T44-8

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Ry. & Indus. Eng'g Co.
Schweitzer & Conrad, Inc.
Westinghouse Elec. & Mfg. Co.

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Wiremold Company

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Federal Elec. Products Co.
General Elec. Co.
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Mongerson's Elec'l Mach. Works
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The most complete line on the market. Hand, foot operated and power driven units. Models for stripping all types and sizes of insulated and lacquered wire and cable.

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PROFILES *of the month*

Marguerite Fenner, for the past six years home economist for Pacific Gas and Electric Co. in its Sacramento division, was transferred recently to the general sales department and given a newly created position as director of home economics of the entire company

Below: A. Emory Wishon, PG and E vice-president and general manager, congratulates Lawton C. Hughes, first prize winner in the 1943 company employee suggestion contest at a luncheon celebrating the twentieth successful year of the plan. Standing to the right are Harry V. Lalor, Fred Frey, J. E. Aymar and W. A. Cohick, other winners. Seated left is P. M. Downing, executive vice-president, right W. G. Vincent, vice-president and executive engineer, chairman of committee heading plan

Bob Bishop, Sylvania sales manager, New York, was in the West last month, visiting the company's district offices. At left, he greets R. L. Osborn (right) of Saviers, Reno, who was on hand for the Sylvania dinner in San Francisco.

Below, from left, Bishop, J. T. Hague, USN, Charles Field, manager of Sylvania's California division, Los Angeles; Carl Brown, of C. C. Brown Co. distributor. Scene is in San Francisco

GETTING STRAIGHT
ON THE FACTS...

P·G·and E· ELECTRIC CAPACITY *Exceeds* that of BONNEVILLE and GRAND COULEE *Combined*

MUCH HAS BEEN SAID about the large electric power projects of the Federal government—Bonneville and Grand Coulee in Washington and Oregon, Boulder Dam on the Colorado River.

They have been widely publicized for the contribution they have made to war production—for the power they have provided for industry, commerce and agriculture on the Pacific Coast.

But the fact is that the P. G. and E. has much greater installed capacity, including purchased power, than any of these Federal projects—*48.7 per cent more than Bonneville and Grand Coulee combined, 89.7 per cent more than Boulder Dam.*

During 1943 the P. G. and E. supplied power to approximately 27,000 industrial plants and affiliated operations. Bonneville and Grand Coulee together served only fifteen, six of which are aluminum.

P. G. and E. power went to 40 shipyards and allied plants, 33 iron and steel plants, 4 magnesium plants, 7 cement plants, 126 food processing plants, and more than 26,700 smaller industrial plants. P. G. and E. also served 80 military and other governmental establishments; Bonneville and Grand Coulee served 15.

All this in addition to taking care of the normal requirements of more than a million regular customers in the home, in business and on the farm. Such is the achievement of free enterprise.

Always building ahead, soon we will add the 65th generating plant to our far-flung system—Pit No. 5, the largest hydroelectric powerhouse in the network.

Sixty-five power plants to speed victory, to serve a growing population, to keep northern and central California prosperous and great in the postwar period!

P·G·and E·

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"Service-up" your Refrigerator for Hot weather
THE TIME is now, as Spring is here and bountiful Summer approaches, to "service up" your refrigerator.
Do you want to know how to save the life of your appliances?
KEEP THIS BOOK HANDY
The Lady of the House AND HER MECHANICAL SERVANTS
Your appliances will have to work as never before in '44. You will be doing more laundry at home. Gasoline rationing means you will have to buy food in larger quantities when you shop. You will be doing more cooking and all of your housework. Last year this company brought out the first edition of the booklet, "The Lady of the House and Her Mechanical Servants." We distributed many thousands of copies. But apparently this amount was not enough. Now we have printed a second edition. If you have not received a copy of this booklet or cannot find the one you got last year, come into any company office today and get your FREE copy.
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